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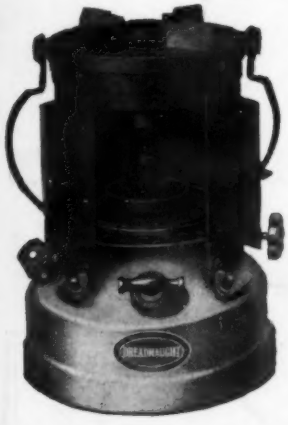

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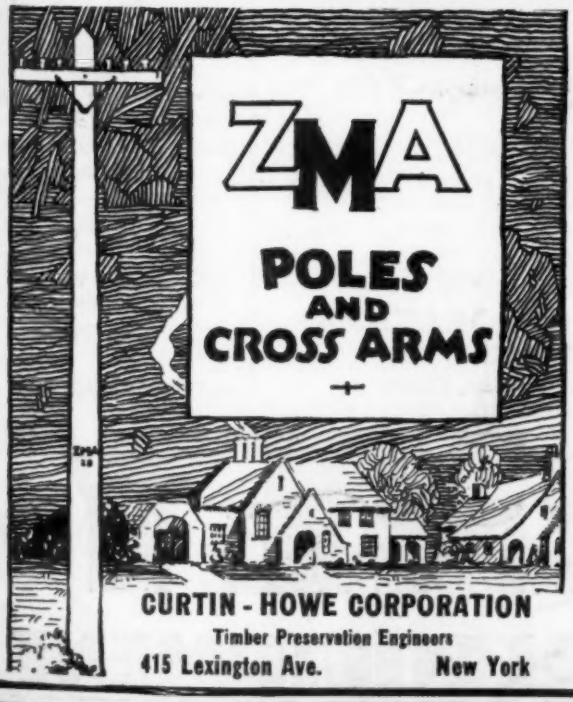

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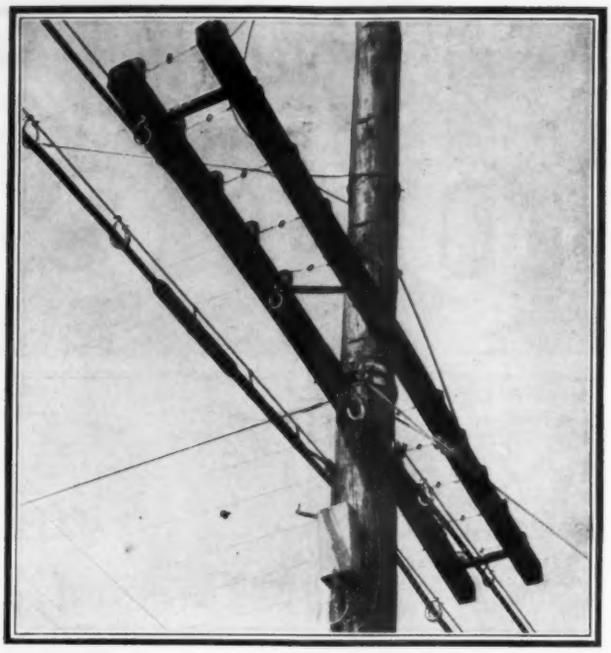

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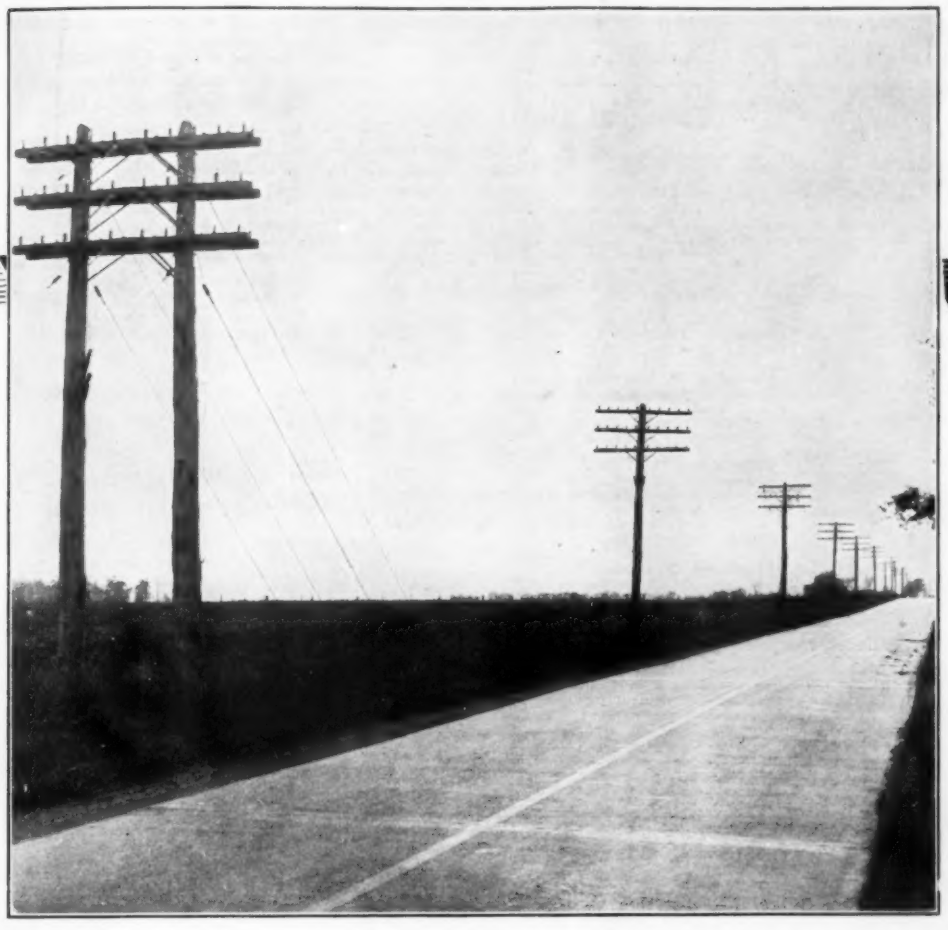
Northern White Cedar Poles



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Telephone Engineer

Volume 34 SEPTEMBER, 1930 No. 9

Telephone and the Arctic Thirty-three years after Salomon-August Andree with two companions flew into oblivion over the Arctic seas in his huge balloon, the gruesome tale of their battle with the elements has been partially revealed through the finding of their bodies and equipment on White Island.

Undoubtedly the preparations for their expedition were most carefully made and their last communication to the world—"good journey northward"—was brought back to civilization by a carrier-pigeon.

There is a vivid contrast between the Andree method of communication and that of the recent Byrd Antarctic Expedition. Commander Byrd tells us that his reliable telephone communication at the South Pole played a great part in the success of his expedition. The extreme weather conditions at the pole and the hard usage to which their telephone equipment was submitted, was a test without parallel. Yet his telephone gave fool-proof service when required.

We give the highest praise to these aerial pioneers and believe that the disaster which befell Andree's venture might have been averted had the radio and telephone been available to him as it was to Commander Byrd. Swift and sure communication could have called ships to his aid.

While the telephone is giving greater service to the world's work and exploration than ever before, the coordinated efforts of the telephone industry are centered in giving the public an even better service tomorrow at lowest possible cost.

Home Telephone Convenience Every telephone convention finds delegates eagerly discussing methods of improving telephone convenience in the home, and searching for a means of acquainting home owners and home builders of the desirability of increased telephone service.

Unique window displays and circular advertising have brought increased extension sales to many telephone companies, by pictorially presenting the convenience of additional telephones. As a result, homes once considered advanced with a telephone in the front hall, now have extensions beside the kitchen stove, in the bed-room, in the laundry, and anywhere else where a telephone would be an economy by the saving in time and steps.

That is, those who know of this extension service have equipped their homes thusly. Modern homes are being built with a garage to accommodate at least two cars. One bathroom has long since ceased to be sufficient for the family use. Electric light companies have placed emphasis on the convenience rather than the necessity of many outlets in each room of the new home. Yet telephone companies were slow to recognize this opportunity for additional extensions.

Complete telephone convenience in the home cannot be reached generally until we cooperate with the builders of new homes and the remodelers of old homes to the extent that each room is so wired with a permanent outlet that a telephone may be connected in a minute's notice, just as a floor lamp or vacuum cleaner may be plugged into the waiting socket. Some of our more costly residences are equipped in this fashion. However, the cost of such equipment is so very reasonable, that the humblest cottage should not be without it.

The homes of comfort today have a handy telephone in each room which is used frequently. Portable telephone service is suitable where the telephone convenience is desired only at intervals.

Telephone Ownership More than a decade ago, a number of large corporations in the United States laid the foundation for a new type of ownership in American business—public ownership of public utilities.

Among the first examples of this new responsibility to further the nation's welfare and prosperity, are our telephone systems. Upward of one million men and women in nearly every town and city in the country now own several shares of their local telephone company stock. Progressive companies pay regular satisfactory dividends. Many of our companies have not missed a single dividend since

the inauguration of the stock buying plan. Excess earnings go into the extension and improvement of telephone service, which must constantly and consistently build ahead of the communication needs.

The public uses the telephone. It depends on it and believes in it. It is therefore only fitting and proper that they should own and control the system. Men and women in all walks of life are represented in this investment democracy. And it is a democracy, for the average holding is very small. The growth of investments in public utilities in the country is amazing. Yet it is sound business to place responsibility for the nation's welfare upon the shoulders of the people themselves who benefit from it. Mutual public relations make the public utility an institution which gives us the advantages of a government controlled project without the many disadvantages which are so often apparent.

Cooperation Will Hasten Prosperity

Labor Day marks the end of the summer season and with its passing we look ahead to the fall months and the usual upswing in business which comes at that time.

Information to the effect that the outlook is distinctly more optimistic despite the depression that has prevailed throughout the year, comes to us from nearly every section of this country and many parts of the world. A London paper states:

"The United States should lead a recovery, just as we led the cynical trade movements in the decades preceding the war. The size and power of their credit and capital resources, the vitality and resiliency of their economic structure, have placed the United States in that position of leadership."

To speed this improvement, we as leaders of public utilities, as manufacturers, as jobbers and as employers, must cooperate optimistically. We must stop looking backward and look ahead. Reliable business surveys indicate that the fall of 1930 will inaugurate another term of substantial progress and prosperity for all people. We should see more than the usual upturn of the business scale which comes with the fall season.

The exceptional prosperty which was reached in 1929 was not a criterion of normal conditions. But as we approach a better business atmosphere, we can be assured that it is an earned, sound prosperity rather than a speculative one. The fact that jobs are insecure, and that the depression period is not yet over, has caused many millions of people in this country who are comfortably fixed, who have money in the bank, and who are well able to buy the things they need, to hold back because of their uncertainty of the future. They are retarding business recovery by this very pessimistic course. As employers we can take a step toward improved conditions by assuring our employees that no further reduction in forces and wages will be made. We will thus remove worry and give those under us courage to stimulate the country's purchasing power. Such a course of action automatically will bring many new orders to the nation's industries.

We should not hesitate to spend available funds for any needed supplies and repairs in our industry. This not only will help the telephone industry, but will create more employment and consequently everyone will share in this greater prosperity. The goal of prosperity can be definitely accomplished if we refuse to reduce our forces, if we refuse to reduce our wages, and if we make all necessary improvements and repairs without fear or delay.

High Standards for Telephone Men and Women

Public utilities in America have succeeded in establishing and maintaining service to a high point of efficiency and their patrons have come to expect the same sort of treatment in their individual contacts with members of the utility organizations.

Leaders in the industry have discovered that the human service rendered is fully as important as the mechanical service, especially in anticipation of the future stability of the industry. Therefore, while they have developed machines and equipment to almost the last degree of perfection, they have not failed to emphasize the importance of the relationship between their employees and the public. It is particularly true that a large percentage of the service rendered by the telephone company is of a personal nature, and that consequently a code of ethics which merits the approval of all telephone users must be followed diligently by members of the industry.

Telephone companies assure themselves of the physical well-being of all their employees by insisting on a rigid physical examination before their services are accepted.

In the schools which are maintained for instruction in all phases of the telephone industry, employees are taught to be human along with their study of more technical subjects. They are reminded that kindness and courtesy receives kindness and courtesy, and that it is well to remember that the outsiders with whom they are dealing are human beings as well as themselves.

It is with particular pride that we note employees of telephone companies among the leaders of civic and political circles of almost any group of citizens. The telephone man owns his own home. His home life is ideal.

Probably in no industry do employees attain a higher physical and mental standard or make better citizens than the many thousand of men and women in the telephone world.

Transposition Theory and Design

In This Article Mr. B. C. Burden Discusses the Two Fundamental Types of Transpositions— Read What He Has to Say About Them

General

Crosstalk on open wire leads which is due to electro-magnetic and electro-static unbalance can be eliminated by means of transpositions.

A transposition, as most of us know, is made by inter-changing the wire position at certain predetermined points in the lead.

There are two fundamental types of transpositions, known respectively as physical and phantom. (See Fig. 4.) Phantom transpositions are necessary where open wire circuits are phantomed.

Theory of Transpositions

Referring to Figs. 1 and 2, let us see how a transposition functions to reduce crosstalk.

Considering circuit 1 and circuit 2 as

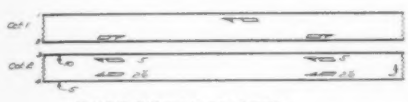


Figure 1 - Untransposed Circuits

disturbing and disturbed circuits, respectively, we find that due to magnetic and electric unbalances a crosstalk current in circuit 2 is set up in the direction indicated. (No attempt is made to show the induced current due to wire 1 of circuit 1 as the field of wire 2 would predominate because of its proximity to circuit 2.)

In order to bring out the effect of wire spacing and transpositions on the magnitude of the induced crosstalk voltage arbitrary values have been given to the voltage induced on each wire.

You will note that in Fig. 1 there is 10 minus 5, or 5 volts, which is effective in causing crosstalk in circuit 2.

In the above and in following figures the direction of the current in the dis-

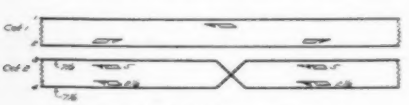


Figure 2 - Transposition in the disturbed circuit

turbed circuit is based on Lenz's law, which states that the direction of induced current flow is always opposite to that of the inducing current.

Let us next place a transposition at the exact midpoint in the parallel of the two circuits as shown in Fig. 2. Now the low and high side of the disturbed circuit combine to form a balance and instead of voltages of 5 and 10 on the two wires of the disturbed circuit we have 7½ volts on each wire, hence the two voltages balance each other and no crosstalk current will flow.

Let us now consider the case of transposition placed in the disturbing circuit with the disturbed circuit untransposed. (See Fig. 3.) In this case we will have equal and opposite voltages induced on each wire of the disturbed circuit and these will neutralize so that no crosstalk current will flow through the subsets at the end of the line.

It is preferable that the effect of transpositions be considered as a neutralizing of induced voltages rather than a balancing effect.

Distance Between Transpositions

In the preceding paragraph we have assumed that a single transposition placed at the midpoint in a parallel of two circuits will produce complete neutralization of crosstalk. This assumption is approximately correct in providing the overall length of the two circuits under consideration is not over one mile.

The necessity for limiting the length of line over which one transposition is effective is due to two factors, which are

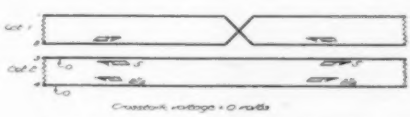


Figure 3 - Transposition in the disturbing circuit

phase change and attenuation.

Phase change refers to the fact that the phase of the voltage, considered at any instant, varies at all points along the telephone line. A midpoint transposition in a long line would therefore not give complete neutralization, as the voltage in the disturbing circuit in one-half of the line would be at a different point in the cycle than in the other half. With short sections, such as a mile or less, the phase shift between the two ends are so small as to be negligible, hence the voltages along the two halves of the transposed circuit are practically the same.

The attenuation of the voice in passing over a telephone line is much more important than phase change in fixing a limiting length over which transpositions are effective. It is easy to see that unless relative short sections are used the voltage and current values will be much less along the end distant from the voice source. It is therefore essential that transposition be placed at short enough intervals so that the two sections on each side of the transposition point will have the same effect.

Practically all long distance lines over the country have transposition spaced at one-quarter mile interval.

Transposition Design (Non-Phantomed Circuits)

If only two circuits were to be considered the problem of designing a suitable transposition scheme would involve merely specifying transposition at one-quarter, one-half and three-quarter points in the mile as shown in Fig. 5.

Usually, however, a larger number of circuits than two are carried on a lead, and as every circuit will tend to crosstalk into all others, therefore the problem becomes more complex. To care for the many circuits carried by long distance leads transposition schemes have been designed by the Bell System which are applied in eight-mile sections and which balance all circuits on a lead of forty wires.

For the smaller Independent companies the transposition problem usually involves transposing metallic farm lines and possibly short toll circuits. Advantage may be taken of the fact that the tendency of non-adjacent circuits to crosstalk is much less than for adjacent circuits, and the fact that the circuits only extend for a few miles.

For distances of ten miles or less the transposition scheme shown in Fig. 6 will be found very satisfactory and is so arranged as to coordinate nicely with paralleling power lines having normal three-mile barrels. This scheme does not bal-

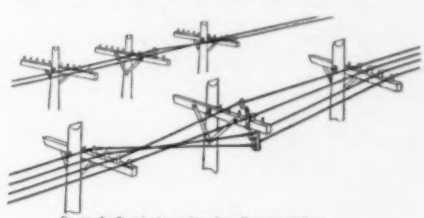


Figure 4 - Physical and Phantom Transpositions

ance all circuits but is so arranged that the circuits not balanced are non-adjacent, hence for the distance normally encountered the crosstalk is negligible.

Where there are no existing power lines the scheme shown should be applied between section corners. When paralleling power lines are proposed it is then easy to ask the power company for three-mile barrels with transposition to fall at section corners.

Phantom Transpositions

If open wire circuits are phantomed then phantom transpositions will be re-

quired to balance the phantom circuit to other circuits and to paralleling power lines.

You will note that there are four

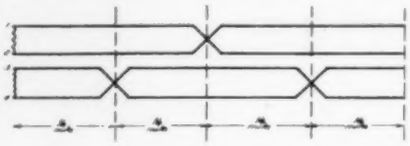


Fig 5 Transposition scheme for two circuits

methods of making phantom transpositions. Fig. 8 shows each method and its effect on the crosstalk balance within the group.

The necessity for having phantom

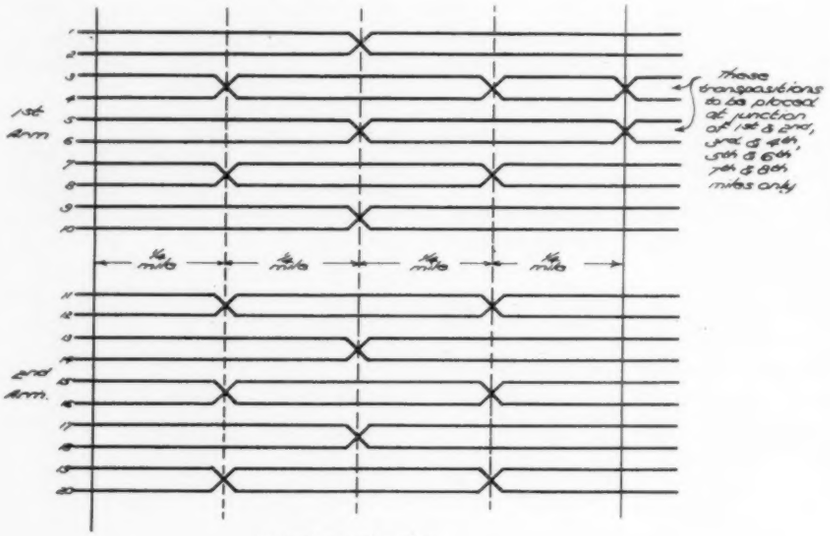

1st Arm
2nd Arm
These transpositions to be placed at junction of 1st & 2nd, 3rd & 4th, 5th & 6th, 7th & 8th miles only
¼ mile
¼ mile
¼ mile
¼ mile
Telephone circuits
Paralleling Power Line
Note: Power transpositions should be placed at mile points omitting every third transposition.

Fig. 6 Transposition scheme for Rural Lines

transpositions on phantomed lines should be evident when we consider that the two wires of a side circuit act as a single wire with respect to the phantom current, therefore a physical transposition would have no effect in transposing the phantom circuit.

The inductive relations within a phan-

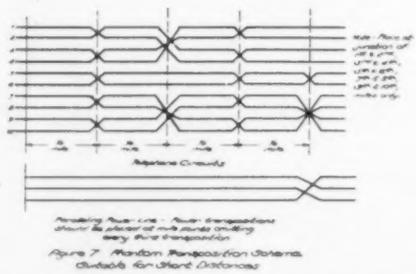


Figure 7 Phantom Transposition Scheme Suitable for Short Distances

tom group are such that there is a much greater tendency for crosstalk to take place than would be the case were the same circuits non-phantomed.

In a phantom group crosstalk may develop from side to side, phantom to side No. 1, and phantom to side No. 2. In placing transpositions it is necessary to balance these three effects within the group and in addition balance the group against other circuits on the lead and also against paralleling power lines.

The following notes point out some of the pertinent facts about phantom transpositions:

No. 1—A type 2 and a type 3 transposition placed at the ¼ and ¾ points in a section will balance side to side, phantom to side No. 1, and phantom to side No. 2.

No. 2 — Two physical transpositions placed at the same point in a phantom group will balance both sides to phantom but will not balance side to side.

No. 3 — Phantom transpositions cause the side circuits to shift their position on the crossarm and this must be kept in mind in balancing the group to other circuits, as the magnitude of the induction of side circuits into other circuits will vary greatly on opposite sides of a phantom transposition.

No. 4—If a phantom group is carried on brackets, the brackets of each side circuit should be so placed that the wires of each circuit are in a horizontal plane. A uniform spacing should be maintained between the two pairs of brackets. This will insure that the phantom to side crosstalk will be at a minimum and no transpositions will be required except for the reduction of the side to side crosstalk.

Fig. 7 shows a scheme for transposing wires carrying two phantom groups. This

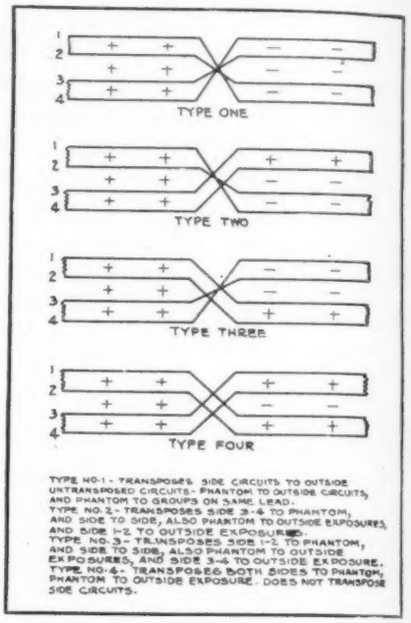

TYPE ONE
TYPE TWO
TYPE THREE
TYPE FOUR
TYPE NO-1 - TRANSPOSES SIDE CIRCUITS TO OUTSIDE UNTRANSPOSED CIRCUITS - PHANTOM TO OUTSIDE CIRCUITS, AND PHANTOM TO GROUPS ON SAME LEAD.
TYPE NO-2 - TRANSPOSES SIDE 3-4 TO PHANTOM, AND SIDE TO SIDE, ALSO PHANTOM TO OUTSIDE EXPOSURES AND SIDE 1-2 TO OUTSIDE EXPOSURES.
TYPE NO-3 - TRANSPOSES SIDE 1-2 TO PHANTOM, AND SIDE TO SIDE, ALSO PHANTOM TO OUTSIDE EXPOSURES, AND SIDE 3-4 TO OUTSIDE EXPOSURE.
TYPE NO-4 - TRANSPOSES BOTH SIDES TO PHANTOM, PHANTOM TO OUTSIDE EXPOSURE. DOES NOT TRANSPOSE SIDE CIRCUITS.

Fig. 8—The four types of phantom transpositions

scheme is arranged to give excellent coordination with paralleling power lines transposed to three-mile barrels. Good crosstalk balance is obtained within the phantom groups, but the circuit on 5-6 is only partially balanced to adjacent side circuits. However, little crosstalk should arise with the distances over which the scheme will ordinarily be used. The scheme shown contains more transpositions than would be necessary if it were not desired to balance to power lines.

A. J. PARSONS IN COMMERCE CLASS

A. J. Parsons, Springfield, secretary of the Illinois Telephone Association, is one of a class of commercial and trade organization executives now taking instruction under Dean C. M. Thompson, dean of the college of commerce of the University of Illinois, at Northwestern University, Evanston. The class is part of a national institute held under the auspices of the Chamber of Commerce of the United States, National Association of Commercial Organization Secretories, American Trade Association Executives and Northwestern University.

Convention Schedule

United States Independent Telephone Association, Stevens Hotel, Chicago, October 14th, 15th, 16th and 17th.

Illinois Telephone Association, Hotel Pere Marquette, Peoria, November 12th and 13th.

Missouri Telephone Association, Hotel President, Kansas City, November 18 and 19.

Prevention of Singing and Carrier Suppression

Further Discussion by F. J. Dommerque, Fellow A. I. E. E., on Carrier Current—This Installment Is a Continuation of the Discussion in the July Issue—You Should File Each Installment

In the circuit of Fig. 1 of the preceding paper two kinds of bridges are employed, the low-frequency bridge LB, where the subscriber's line enters, and the high-frequency bridge HN at the end of the line where the carrier joins it. The two high-frequency bridges HN at the two ends of the line are effective in preventing the energy from the output of the modulator to reach the input of its associated demodulator and thereby cause "singing." These two bridges are in "conjugate" relation, having the line with the carrier frequency on one side and the balancing network, which simulates the impedance of the line, on the other side. If the impedance simulation is perfect, an e. m. f. existing in the transmitting circuit of the hybrid transformer will not cause any current to flow in the transmitting side of this transformer. Hence we have what may be termed "zero coupling" between input and output circuits of the carrier system, which will not give cause to continued oscillations or singing. Should, however, the impedance simulation be imperfect, singing may easily set in, if the two bridges placed in conjugate relation were not present. This kind of singing is called "end to end" singing. We also have a "local" singing, which occurs at the local terminal when the balancing network fails to simulate the local line and sets up an e. m. f. which causes singing, which is aggravated by the circumstance that frequently an amplifier is inserted behind the demodulator, whereby the energy fed back into the receiving branch may become as large as the energy originally supplied. Local singing may be prevented by using two different frequencies for transmitting and receiving; then the filter F_2 in the receiving circuit will, as stated before, block the return of the output current on itself.

Thus we have two means of preventing singing, either the use of a high-frequency bridge or the use of different frequencies in the two directions with the low-frequency bridge only.

Suppressed Carrier

Returning to Fig. 1 in the article on carrier systems in the February TELEPHONE ENGINEER and comparing the form of the plain sine wave with the form of the modulated wave it will be noticed that the boundary lines on top and bottom of this modulated wave—that is, its envelope—retains the form of the plain sine wave, and that the points at which the current passes through zero remain equally spaced. Turning now once more to the illustration of carrier wave modulation on page 29 of the August, 1928, TELEPHONE ENGINEER and comparing curve A of the modulating voice wave with curve C, which is the modulated wave with the carrier and both side bands present, we see that the form of the envelope is still retained and that the points where the current passes through zero are still equidistant.

Now we compare this curve C with curve D, which represents the modulated curve with the carrier and one side band only. It will be found that not only the form of the envelope has changed but that also the equal spacing of the zero current points has not been retained. Hence the uniformity of the curve form has altered by the omission of one side-band. There has been introduced some distorting element which, of course, will be transmitted to the demodulator and may have an undesirable effect upon its output. To decrease the possibility of such distortion to a minimum, it becomes expedient to make the demodulator output large in comparison to the distorting current which can be done by making the carrier large in comparison to the components of the side band. But making the carrier current large will increase the possibility of crosstalk and interference noise from external sources when we come to insert repeaters in the long-distance lines, so that finally it has been found to be the best policy to suppress the carrier entirely in the line.

In order to do this, means and ways will have to be found to eliminate the carrier from the modulator output at the transmitting end. This is effected by the push-pull arrangement in the modulator discussed in a previous paper of the Carrier Series. The Fig. 3 in this paper shows where the carrier is applied to the modulator circuit by means of the transformer T_2. Then the carrier frequency currents are balanced out in the differential transformer T_3, but not the side band currents which are the result of modulation of the carrier frequency and the speech frequencies which have been applied simultaneously to the modulator.

The difficulty of generating a carrier at the receiving end arises in finding a method whereby synchronism of both the carriers, the one at the transmitting end and the one at the receiving end, is obtained and maintained. There are numerous factors affecting the frequency stability. They may be divided into internal and external factors. Internal factors are to be found in the apparatus, such as variations in power supply, particularly in the plate supply; then in the tubes, which may not be of the same quality, some may be more deteriorated than others, etc. External factors may be the condition of the line itself, its attenuation, or the influences on the line by change in temperature, by humidity, etc. All these factors have to be guarded against.

A favorable circumstance is the requirement of smaller line currents with suppressed carrier. A still greater advantage is presented by the advances in the design of tubes. All the improvements made in the last ten years will ameliorate the endangering factors, but will not entirely remove them, a suppressed carrier renders the amelioration much easier and more effective.

To solve the problem of synchronism; that is, of producing a carrier current at the receiving end which has exactly the same frequency as the carrier current at the transmitting end, the carrier current for both places had originally been obtained from one and the same source. At one of the terminals a frequency was produced by a vacuum tube oscillator, which was slightly higher than the speech frequency band. Current of this frequency was then supplied to another vacuum tube in such a manner that this second tube would be overloaded, and in consequence furnish a strongly distorted wave form with prominent harmonics, which were taken off individually by means of a system of filters, and then used as carriers for the different carrier channels. If, for instance, the frequency generated by the first tube (oscillator) was 5,000 cycles, then the higher harmonics would be the multiples of 5,000, namely 10,000, 15,000, 20,000, etc. This combination of first and second tube circuit was called the "harmonic generator."

In case the fundamental or base frequency current had to pass over the line

to reach the other terminal, it would first be amplified and then transmitted to the other end and there supplied to the second tube in the same manner at the originating end. From this second tube the desired harmonics were filtered out.

In the case where the higher frequency was to be used for transmitting and receiving at the same terminal, it was taken from the harmonic generator to an amplifier (harmonic amplifier) and then to the modulator. In the diagram in Fig. 1 an outline is given of the arrangement for either one of the two cases. HG is the harmonic generator, HA the harmonic amplifier, M the modulator, HF the high pass filter, TA the transmitting amplifier, TF the transmitting selective filter, BFA the base frequency amplifier, F its filter, RF the receiving selective filter, DM the demodulator and RA the receiving amplifier.

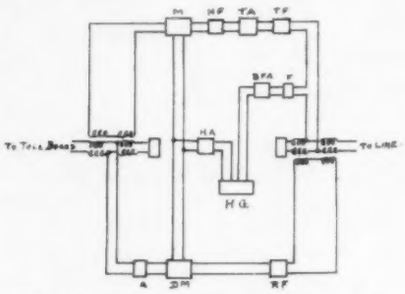


Fig. 1—Suppressed carrier terminal arrangement

It must also be taken in consideration that the lower base frequency carrier when passed over the line is considerably less attenuated than a higher frequency carrier would be, because the higher the frequency the greater the "ratio" of attenuation; and also that the side band becomes attenuated during transmission over the line. The final result with suppressed carrier, therefore, is that there is less exposure to unfavorable influences than in the case where the carrier is transmitted.

In our discussion of the technique of modulation in a preceding paper we have described the self-oscillating modulator and demodulator. From this description it becomes apparent that in the latest system of carrier suppression no harmonic generator is employed. In the type C system, of which we intend to speak in a future paper, the harmonic generator is not in evidence either. However, our brief description of the harmonic generator will have some educational value.

We should add some notes on signaling over carrier telephone circuits, but this subject has been mentioned before in a paper on the development of the modern ringing equipment (May, 1929), where the use of the 135 cycle ringing current was described, and will be taken up again in the discussion of the C and D carrier systems, when it can be explained to better advantage.

NEW LABORATORY ESTABLISHED IN MURRAY HILL

A new laboratory will shortly be erected by Bell Telephone Laboratories in Murray Hill, N. J., according to an announcement made by Dr. Frank B. Jewett, president of Bell Telephone Laboratories. Property to the extent of 200 acres has been assembled in the block bounded by Mountain avenue, Glenside road, Glenside avenue, and Diamond Hill road, in the borough and township of New Providence.

ILLINOIS TOWNS TO HAVE NEW LINE

Construction of a new telephone line from Little York, Ill., to Aledo, Ill., has been started by a construction crew of the Central West Public Service Company, according to Charles Holsclaw, manager of the Aledo telephone exchange. The line will follow the highway north from Little York to the point where it intersects with state road No. 3.

CONVERSATION BETWEEN OKLAHOMA CITY AND TULSA SIMPLIFIED BY CABLE

The first direct underground long distance cable between two cities has been completed and is now in daily use. It extends from Oklahoma City to Tulsa, following a route as direct as possible, totaling 103 miles. More than 100 of the 300 voice channels in the cable are being used. The other circuits will be placed in service as they are needed, according to R. J. Benzel, general manager of the Southwestern Bell Telephone Co., which engineered the project.

Plans for the Oklahoma City-Tulsa cable were first considered in 1927 when it was discovered that the number of calls between the two cities was increasing daily. The preliminary survey of the route over the shortest distance between the two cities was started in July, 1928, and was completed two months later.

Builders of the modern voice highway began work last November. First came a light plow to cut roots and open a way through the hard clay, breaking a path for the heavier machines which were to follow.

Since the laying of this type of underground cable across country was entirely a new project, it became the job of those in charge to develop efficient and economical machinery and equipment for cable laying. It was F. B. Pitts, supervising construction foreman of the Southwestern Bell Telephone Co. in Oklahoma City, who developed a trenching machine which combined the various operations in laying the tape-armored cable.

Two large tractors pulled the trenching machine designed by Pitts. A trailer equipped with crawlers was attached to the back tractor to carry a reel of cable. The plow was hitched to the trailer and the cable was fed directly from the reel through a "feeding bell" into the trench. Last of all, dragged by chains, came the back filler to pull the loose earth back into the ditch.

But with the laying of the cable the job was not complete. Each of these 700 sections of cable had to be spliced together. And before they could be spliced each wire in each section had to be carefully tested for the slightest imperfection.

Then, after special amplifying equipment to boost the voice currents had been installed at Oklahoma City, Stroud, Okla., and Tulsa, the cable was ready for use.

900,000 TELEPHONES ADDED IN YEAR

Nine hundred thousand telephones were added to the Bell System in the United States during 1929, according to the recently issued annual report of the American Telephone and Telegraph Company. This is the largest number added in any year. Approximately 1,600,000,000 more local telephone calls and 100,000,000 more toll and long distance calls were handled than in the previous year.

To provide for growth and to improve service, $588,000,000 was spent on construction of new telephone plant and $45,000,000 on construction of new manufacturing facilities. It is expected that the expenditures for construction in 1930 will be over $700,000,000 as compared with the 1929 total of $633,000,000.

The use of the telephone in the United States is so universal that it exceeds that of any other country in the world. At the end of the year there were more than 20,000,000 telephones interconnected in and with the Bell System in the United States. Approximately 4,400,000 of these were telephones in independent connecting companies — about 7,700 different companies and 30,000 rural lines. Practically any one of these 20,000,000 telephones can be connected promptly, not only with any other telephone in the United States, but with 9,000,000 telephones in Canada, Cuba, Mexico and Europe.

The rapid growth in the business during 1929 necessitated large additions to the forces, and the total number of employees at the end of the year, including those of the Western Electric Company, Incorporated, was 454,000 as compared with 395,000 December 31, 1928, an increase of 59,000—comprised of 39,000 men and 20,000 women. To provide for this growth and to take care of normal turnover, it was necessary to train more than 175,000 new employees.

Originating Office Circuits

This Is the Third Installment of the Series of Straightforward Trunking System by John H. Levis, Jr., Telephone Engineer to the Stromberg-Carlson Telephone Manufacturing Company, Rochester, New York

Before describing the incoming super service straightforward trunk circuit operations, the various circuits that operate into the trunk circuit proper must be outlined. It is necessary to explain them in order to trace the trunk circuit operation.

The following circuits will be described:

Fig. No. 1—Station line circuit "A" office.

Fig. No. 2—Cord circuit "A" office.

Fig. No. 3—Trunk circuit outgoing to "B" office lamp indication.

Fig. No. 4—Operator's circuit "A" office.

When a subscriber station desires to make or originate a call in the "A" office the receiver of the telephone is removed from the hook which in turn operates the circuit closing contacts. This connects the transmitter to the line circuit through the induction coil and in turn closes a circuit for the operation of the line relay (L. R., Fig. No. 1) which when operated closes its make-contact and causes the line lamp (L. L., Fig. No. 1), associated with the answering jack, to light.

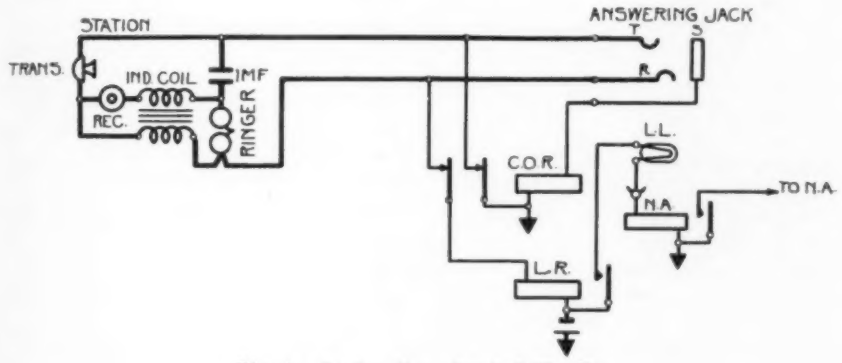


Fig. 1—Station line circuit "A" office

The "A" operator answers this signal or station calling by placing the answering cord or plug into the answering jack (Fig. No. 2). This causes the C. O. R. or cut-off relay to operate from the sleeve of the jack to the sleeve of the plug, connecting S to S. In so doing the normally made contacts that place the (L. R.) relay across the line, open and remove the L. R. from the line, causing the line lamp L. L. to be dark.

The cord circuit (T & R) of the answering cord is now connected to T & R of the line circuit and in direct connection with the station circuit of Fig. No. 1. The "A" operator at this stage operates the listening key (Fig. No. 2), which places said talking circuit (T & R, Fig. No. 4) across the answering cord and thence to the subscriber's station. Both the station and operator can carry on two-way communication.

The station circuit (Fig. No. 1) is the well-known Booster type sub-station telephone. (For details refer to page 139, Figs. 82 and 83, in "Telephone Communication," by Wright and Puchstein.)

The operator's circuit (Fig. No. 4) is also well known in the telephone art as the anti-side tone type. This is used in order that the operator will not receive in her ear the adjacent operator's conversation or room noises. It, also, reduces the sound of her own voice in her ear while talking to a subscriber.

In tracing the operator's circuit (Fig. No. 4) it will be seen that the reason the operator does not receive much sound from her own voice is that the receiver is in a Wheatstone bridge circuit, the line circuit being the unknown variable arm and the non-inductive resistance in the receiver circuit (Fig. No. 4). This approximates the average line circuit and sub-station circuits for minimum side tone or balance.

The outgoing transmission from the operator to the station subscriber passes by induction to the line, through the double multiple primary windings in series with the transmitter which gets its battery supply through the impedance coils in the primary circuit. The 4 m.f. condenser across the impedance coils allows the voice frequencies to circulate through it and the transmitter and primary windings of the induction coil. Should the condenser be omitted the outgoing transmission would be very poor because the high frequency of the circuit would not have a return circuit due to the fact the impedance offered by the coils is very high. On the other hand the impedance coils are in the circuit to prevent cross-talk due to a common battery supply.

The operator's receiver, connected in a more or less balanced circuit, will receive incoming voice transmission because voice frequencies propagated at the sub-station telephone transmitter enter the operator's circuit over T & R (Fig. No. 4) from T through S of induction coil to receiver, thence to the 2 m. f. condenser to R.

The induction coil winding S_2 and the non-inductive winding are in series across the receiver and have a much greater impedance value than the receiver. Therefore it will receive the greatest amount of voice energy The impedance-resistance shunt circuit absorbs some energy, but it is hardly noticeable when removed. (Fig. No. 4).

The calling station (Fig. No. 1) obtains its transmitter battery from the

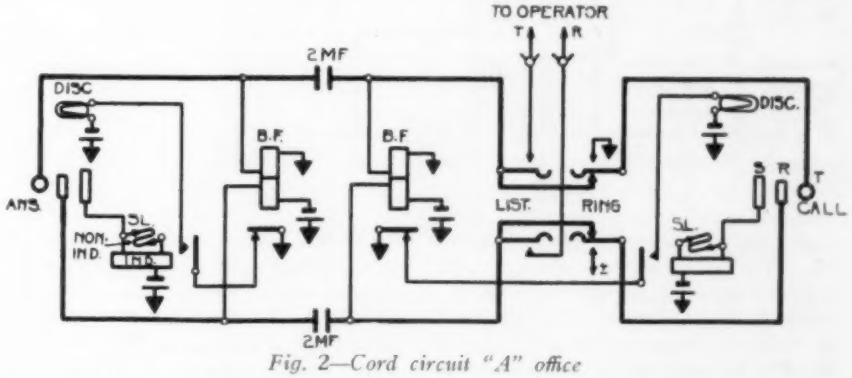


Fig. 2—Cord circuit "A" office

cord circuit (Fig. No. 2) through the relay impedance coil (B. F., Fig. No. 2). The ohmic resistance is low enough to supply proper energy for standard voice transmission in connection with the answering cord. The same is true of the calling cord (Fig. No. 2) with the plug in the line answering jack or in an out-

going trunk circuit (Fig. No. 3). The S. L. relay (Fig. No. 2) operates through the C. O. R. relay (Figs. 1-3) and closes the disconnect or supervisory lamp circuit to the B. F. relay (Fig. No. 2). Should the B. F. relay be operated with a station receiver removed, the lamp circuit will be open at the break contact of the B. F. relay, making a dark lamp. When the station places the receiver on the hook, relay B. F. releases and the break contact closes, lighting the supervisory or disconnect lamp (Fig. No. 3). When this takes place it indicates that the operator should remove the plug from the line jack and allow the line relay (L. R., Fig. No. 1) to return to the line for subsequent calling. The disconnect lamp in the cord circuit will be dark.

On the sleeve relays (S. L., Fig. No. 2), a non-inductive winding is placed across the inductive or operating winding. This is done so that when the plug is removed from the line jack the inductive winding current is broken and the reaction of the self-induction passes through the non-inductive winding causing it to die down without passing into other circuits while dissipating. The main reason for its use is that the operator while operating the position will not get the full force of the inductive kick from a plug, being pulled down. The kick comes from contact with the plug and either the metal frame of the key shelf or another plug being held in the hand.

The "A" office operator has now received the desired office and station number from the subscriber. The operator then picks up the calling plug of the cord circuit that is connected to the station with the answering cord and places it into the proper office outgoing trunk jack. The operator is guided in this by a lighted indicator lamp, showing that the trunk is available for service. When the trunk is plugged into, the S. L. relay (Fig. No. 3) operates and opens the indicator lamp circuit, automatically extinguishing the light. This same relay causes another trunk indicator lamp in the same office group to light. This may be traced out by referring to (Fig. No. 3) and using the first trunk jack for the tracing of same.

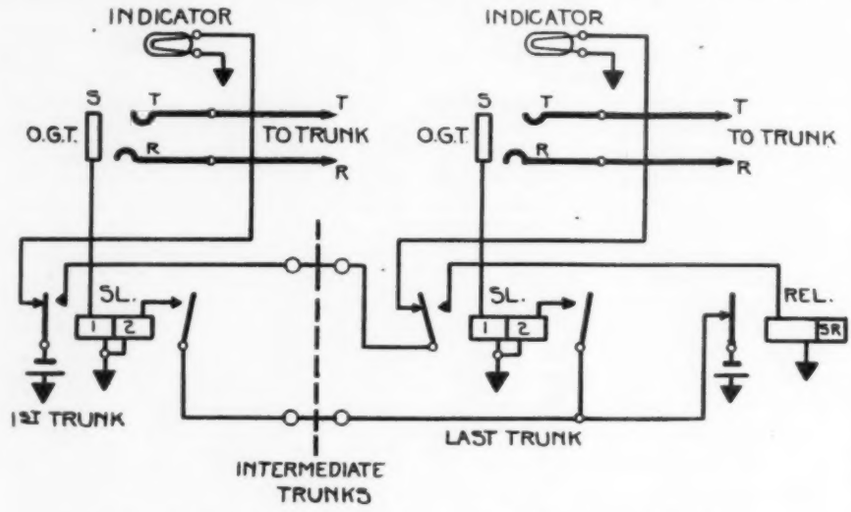


Fig. 3—Trunk circuit, outgoing to "B" office lamp, indication

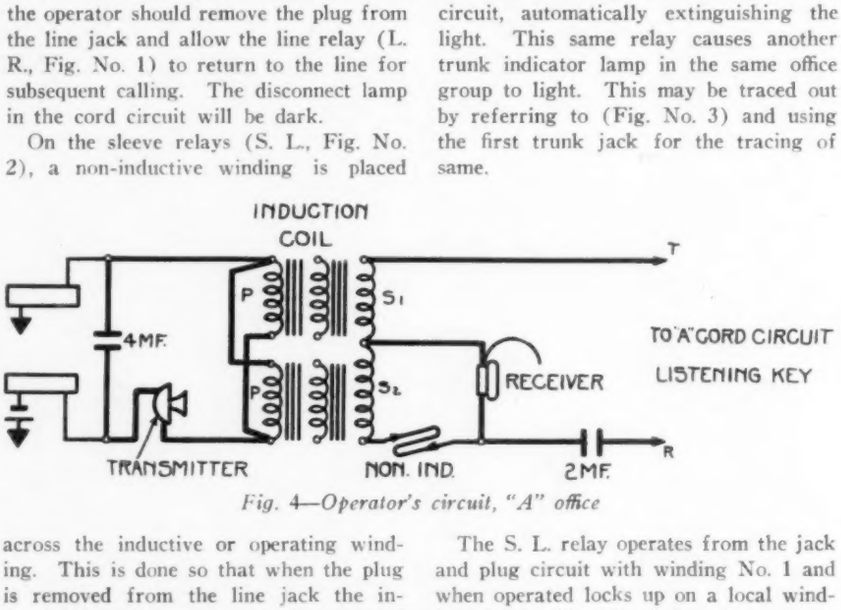


Fig. 4—Operator's circuit, "A" office

The S. L. relay operates from the jack and plug circuit with winding No. 1 and when operated locks up on a local winding circuit (No. 2). This locking circuit control wire is common to all of the trunk (S. L.) relays in a particular office group. Connected to the open or make contact of the last trunk (S. L.) relay (Fig. No. 3) is the show release relay (Rel. S. R.) which has a normally made contact that keeps the control wire to the locking windings closed (No. 2 S. L. relays). When the last trunk is taken the (Rel.) relay operates, opening the common control wire and causing the (S. L.) relays that do not have plugs in them to release. This allows a non-busy or idle trunk indicator lamp to light. Should all of the trunks be busy when the last trunk is taken the (Rel.) relay remains operated until a plug is taken from a trunk jack. The reason for the (Rel.) relay being slow to release is so that should some of the (S. L.) relays be a little slow in releasing it will allow them to release before the common control holding circuit again closes. This eliminates the possibility of tying up a non-busy trunk.

One of the advantages of having the (S. L.) relays lock up is that in some trunk groups the jack wear will be evenly distributed in the jack strip. Another advantage is that at the "B" or trunk end it will give the "B" operator an opportunity to remove plugs from the jacks according to the disconnect signals before an incoming call lands on a trunk in which there is a plug in a jack.

With the common (Rel.) relay in the trunk circuit and a long holding time encountered on the last jack—and on any other numbering backwards from the last one—the release of the (S. L.) relays of non-busy jack circuit will release when the last trunk (S. L.) relay is pulled up. The same results are thus obtained as though all the trunks traveled to the last one (Fig. No. 3). The operation of the B. F. relay of the calling cord (Fig. No. 2) and what takes place in the trunk circuit proper will be described under "B" trunk circuit operation.

Book Review

Alternating Currents for Technical Students, by Calvin C. Bishop. 317 pages, 8 x 5¾ inches. Price $2.00.

The purpose of this book is to explain graphically and with simple mathematics the fundamental principles of alternating current theory, circuits, and apparatus. The book is intended for technical and vocational students, engineering students and others who are familiar with direct current theory but find themselves called upon to become familiar with alternating current theory and apparatus.

It includes those topics of theory that are fundamental, and apparatus that is standard and in common use in which the application of principles readily appears. The master of the subject chosen will form the necessary background for an understanding of other apparatus that a young man working in the electrical field will encounter in his daily work.

A. T. & T. is constructing a new transcontinental telephone line. Begun several months ago, authorities expect the project to be completed by December 1.

Modern Tools Are Essential

In This Article Ray Blain Recommends Standard Makes of Pliers, Because, He Says, the Lineman Uses Them All Day Long, Consequently More Efficient Results Are Obtained

By RAY BLAIN

There is no doubt but that lack of tools in the early ages retarded the progress of civilization considerably. Likewise in the early days of the telephone lack of proper tools was a great handicap as then tools used for general work were considered good enough to meet telephone requirements. In fact only recently have manufacturers started designing tools to meet peculiar and exacting telephone needs. For example almost any kind of pliers can be used by a farmer in building a barb wire fence, but a plier must be above this standard to be of any real value to a telephone lineman. In speaking of pliers I believe that this is the most important tool in the telephone man's kit and no effort or expense should be spared to obtain the best available. I can highly recommend the various reliable pliers advertised in TELEPHONE ENGINEER for I have used them myself and receive numerous and frequent reports from the field giving them a very high standing among their many users.

The reasons a lineman's pliers should be good are many. First he has them in his hand for the greater part of each day. The handles should be well shaped to fit the hand and yet have room enough between them so that gloves can be worn with comfort. The handles should have a slight spring which prevents bruise of the hands in cutting heavy wire, as this spring acts as a sort of shock absorber. The cutting edge must be good so as to cut copper wire clean, which insures its easy entrance into splicing sleeves. Some linemen prefer 8-inch, others at 7-inch and still some a plier as small as a 6-inch, but perhaps about 8-inch is the one most commonly used on heavy work. There has recently come on the market a multi-power jaw plier that has a double action and double power or leverage action somewhat like a bolt cutter. This plier has many advantages for a certain class of work and many will find a real use for them.

Small pliers for central office work are even more exacting in their requirements than are larger sizes used by the outside man. The knives or cutters of the diagonal pliers must meet accurately over their entire length and be capable of cutting directly to the point. I prefer that the nose of the diagonal plier be somewhat pointed as it makes their use easier in confined places but some like them rounded. However, both styles are available. Some prefer a 5-inch diagonal and others a 6-inch or longer. I believe the exact diagonal depends more or less on the size of the individual's hand.

Then that all important plier, the long nose, for without it we would certainly have a hard time around the exchange, for it reaches into many small places in the equipment where our fingers will not. Long nose pliers can also be obtained in lengths from 5-inch to about 9-inch, and the length most convenient for one to use is the one that should be selected. Many special pliers of the long nose variety can be obtained and will prove a big help around every telephone exchange. Some time ago I had a manufacturer make me a special pair of the long nose style, but with a point on them only 1 inch long. This tool can be used to advantage for stripping the insulation off of wires and has leverage enough that the stripping can be done at the extreme points so that the plier jaws are kept clean. If the insulation is stripped close to the jaws it clings to the plier and must be cleaned off frequently with a screwdriver or knife. While this style of plier is more adapted to the needs of the switchboard installer it is also a very handy tool for jumper work on the main frame. Dial pliers can be obtained and are very convenient for making the adjustments on automatic dials. These are very similar to the regular long nose variety, but are smaller and do not have a needle point. Flat nose or duck bill pliers are very convenient for certain classes of work. Duck bills with the inside of the jaws left smooth are more suited for the adjustment of certain type relays than a spring bender. Cord crimping pliers which are provided with a special opening for crimping switchboard cords to make them fit into the plugs more easily are a great help. Long nose pliers can be obtained with side cutters in them, but personally I prefer these tools be separate. Some prefer needle points while others like a flat point and each type has its advantages.

A good plier presents a pleasing appearance and should have a perfect balance, which is just as important in a plier as a golf club. Bent nose pliers are quite useful for certain kinds of work.

I still maintain that pliers are the most important tool that a telephone man can own and he should have plenty of them. At the present time I own 22 pairs of pliers of every make and description, and strange to say I use all of them frequently. I even have a special pair for skinning fish. I am not quite as bad as a lineman I once knew who had a pair of nickel plated pliers to carry in his good clothes on Sundays, but I do like to have a pair to meet all requirements on every occasion.

After pliers I would list in order of importance connectors, and there are several good makes on the market, some of which have recent improvements that are a decided advantage over the types of a few years ago.

Next comes wrenches, and one does not have to use the old style lag wrench for general purposes as there are numerous types on the market to suit every need. I don't intend to knock the lag wrench for the work which it was designed to do, but so many seem to think that it should be used for everything around the exchange when some other smaller wrenches answer the purpose so much better.

Next we will consider screwdrivers, and there should be good ones and enough of them in every exchange. So much time can be lost when a man is worrying along with an old worthless or worn out screwdriver that should have been tossed in the junk heap years previous. Various sizes should be kept on hand available for different work.

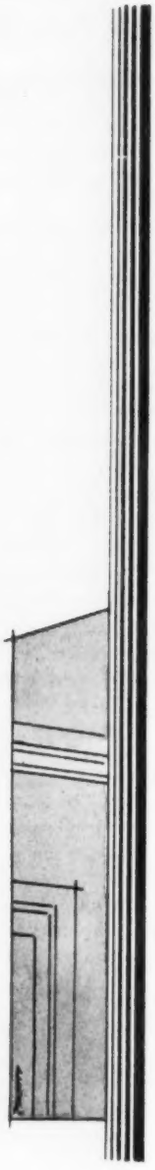
Come-a-longs or wire pulling grips are cheap and should be kept on hand in quantities that will insure enough to take care of any wire stringing or slack pulling job that may come up. A shortage of these clamps or trying to use them when they have worn to such an extent that they slip on the wire is a very costly operation.

Good wood bits are a decided necessity and if you don't believe it just watch the man trying to bore a hole in a pole with a bad one and note his progress. He will not only lose time but will tire himself out so that his efficiency is considerably lowered for the remainder of the day. A brace for pole work should have a fairly large sweep so that sufficient leverage can be obtained.

A good set of wood and iron chisels

(*Continued on page* 45.)

"It's worth it"



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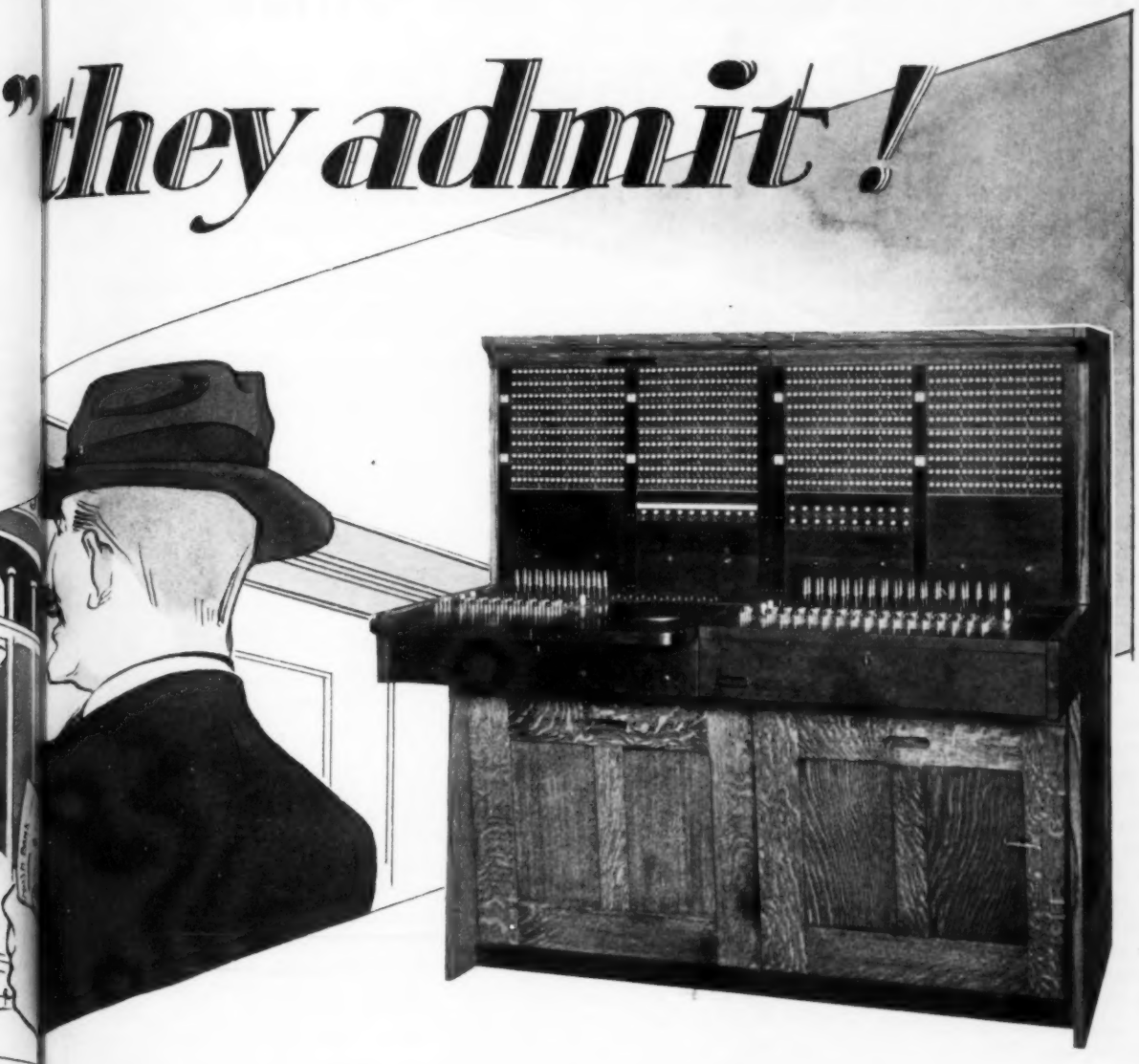
Stromber

"they admit!



Stromberg-Carlson Junior Multiple Switchboard Installations:

Furnish modern service at low cost.
Effect substantial savings in the cost of telephones.
Reduce expense of dry cells.
Supply fast and accurate service.
Permit close supervision.
Provide uniform transmission.
Increase operator efficiency.

"There Is Nothing Finer Than a Stromberg-Carlson"

Carlson

The Importance of the Small Exchange

Address by Minor Corman Dallas, Dist. Mgr. Kellogg Switchboard and Supply Co., Before Telephone Division, Twelfth Annual Convention, Oklahoma Utilities Association at Tulsa, Okla., March 12, 1930

Since October 13, 1901, my first experience in the telephone business, I have heard discussed pro and con the importance of the small telephone exchange, but the thousands of such systems throughout the United States organized and financed in many different ways is the best argument for and will more than offset any argument again that could possibly be mentioned.

In this day of advanced communication facilities it is hard to visualize even the smallest hamlets, villages and surrounding rural districts without telephone service, and I do not believe a mistake has been made by the development of this business even though many small exchanges do not pay operating expenses. The mistake, I believe, is that the proper class of service has not been established, the class for which people will subscribe and pay a reasonable rate. The day of the grounded line with its noise and cross talk and an unlimited number of stations has passed and we should be looking ahead with plans to eliminate such systems that remain in service and for future development accept nothing less than the best. We might well go one step further and demand more than the best as we know it today. I make this statement for the reason that very little advancement has been made in the nature of apparatus furnished by the manufacturers to meet the more advanced and up-to-date demands of the small exchange with the usual number of what are commonly known as rural or farmer's lines. Many new ideas and inventions with improved apparatus and circuits have been introduced to improve city service, but apparently the majority still believe the small exchange and rural subscriber should be content to forever continue the old coffee mill crank type service. I wonder what the housewife would say if the groceryman should insist on supplying whole grain coffee and the old coffee mill instead of the neat package of ground coffee ready for the percolator or if the automobile dealer should insist on selling us an automobile without a self starter. I believe you will agree with me that it will not take a Solomon to answer this question, yet this is exactly what is being offered the small exchange and rural subscribers.

Again stating that the number of small exchanges in existence is sufficient evidence of their importance may I also ask that if they were not of extraordinary importance would they have survived the antiquated poor service conditions that have existed for so many years. If we did not know better, if we had no comparisons to make there would be no argument for improved service, but since we do know better and since we know that our subscribers know better what excuses can we offer for a poorly developed territory and inadequate income when we are still supplying the coffee mill, starterless kind of service with the inevitable cross-talk and grounded line noises. Here may I pause to ask a question? Why have we gone ahead year after year applying the same old methods to the small exchange and rural line development when we know that those methods have been unsatisfactory both from a standpoint of service and revenue? Is it not time that we begin to think of improvement? We know that where there is development there will be telephone service, either commercial or co-operative, and if both of these fail individual service will be provided, any one of which will cost a certain amount of money, and in the long run some one pays the bill. In case of co-operative or individual service the usual procedure, no matter how good the original intention may be, is to build as cheaply as possible, let the property live out its natural life the end of which is hastened on by poor maintenance, with no depreciation fund with which to rebuild and thus the bill for unsatisfactory service has been paid. This co-operative or individual effort is not to be criticized, rather it is very commendable, the importance of telephone service is realized and a public-spirited community meets the emergency. Any such community would appreciate good telephone service and a well maintained plant, but these co-operatives or individuals are not experienced in the building and operation of telephone plants, so the inevitable results are poor service and rapid depreciation and contrary to the belief of many, an ultimate high service cost.

Presumably the small exchange with the usual number of rural lines is considered of no importance by an operating company because it does not produce the required revenue. Just the opposite is probably true.

The required revenue is not produced because we consider the small exchange of no importance. At any rate we know the old methods were not satisfactory and we know that the small exchange is with us to stay, if not the exchange some other method of supplying service, and I believe, even if I stand alone, that there is a solution that such property can be profitably operated, supplying a satisfactory grade of service. To do this we must discard, improve or supplement the old methods for, we must admit, they have failed. The following quotation from the Indiana Telephone Bulletin tells you what I am thinking about:

"An Easy Way to Lose Money"

"If any telephone manager or owner is interested in ways and means of losing money in his business we can tell him how and no charges for our service.

"A dog tradesman once sold a pup on guarantee that he was very smartly bred and would take training very readily. Some time afterward the purchaser brought him back and demanded return of his money on complaint that the dog was a bonehead and couldn't learn anything. 'Well, mister,' said the dog broker, 'in order to teach a dog you must know more than the dog.'

"There may be those engaged in the telephone business who 'don't know more than the dog' and if there be such you will find one or more of the following causes responsible for the failure of their management.

"Poorly designed or cheap John construction.

"Neglected upkeep and no depreciation fund in the bank with which to rebuild plant wear and tear.

"Don't believe in advertising, nor in participation in home community activities and betterments. Lump on a log.

"Thinks cultivation of cordial public relations a fad and that trade building can't be done in his town.

"Has no time to read telephone literature nor to attend telephone meetings where he could learn something.

"Never discounts his bills nor gives a damn about keeping his credit good at home or with his supply houses.

"Careless in his bookkeeping and col-

lecting and worse than that in his reputation for honesty.

"Keeps his exchange like a junk room and his office like a cloud of dust and disorder.

"Refuses to take his patrons into his confidence in what he has or what he needs.

"Or invests unwisely and then establishes rates and terms of payments so arbitrarily the public rebels and leaves him in the lurch financially.

"Any one of the foregoing hobbles will handicap any telephone management and success, and all them combined will drive any business into absolute failure.

"If we want people to respect, patronize and pay us we must be awake and meet them half way in all that goes to make four square, popular citizenship. We cannot be drones nor gougers and get by with it in this day when most people can see and hear and feel deserving merit."—Indiana Telephone Bulletin.

Now let us deviate from the subject of service and look ahead to development and future growth. Have you ever looked back to the days when the many large exchanges in your commonwealth were once small, some of them very small, so small that if they existed today as in the beginning I doubt if there is a person in this room who could not in one business day raise the purchase price. In 1905 I first visited Oklahoma and Indian Territory, for that was before statehood, and at that late date the telephone exchange in Tulsa was not what it is today, for as my memory serves me there were less than five hundred subscriber's stations. Of course you have reason to say that all cities will not grow as Tulsa has grown, so let's mention a few others. Back in those days Sapulpa had a small one-position magneto switchboard, there is also Claremore, Ada, Hobart, Vinita, Bartelsville and a host of others that within those last twenty-five years have grown from the small exchange, considered of no importance, to proportions far beyond our wildest dreams, and I am predicting to you now that the next twenty-five years will see even a greater development. Considering these facts, if we do find it difficult at the beginning to meet operating expenses in the small exchange in the long run it proves to be worth the initial effort.

I have purposely avoided statistical data relying entirely on what I have gained from observation, believing that we can best understand each other by putting forth our views in a conversational way. Just talking these things over.

You may say that so far well and good, but how about the rate question. To this question I frankly admit I do not have a "cure all." It will be largely a matter of individual effort, but back to the beginning I believe that your patrons will be willing to pay according to the class of service rendered. This holds good in all other classes of business and why should the telephone business be an exception.

A few years ago I met a party of friends in one of our southern cities, and that evening had dinner in the rathskeller of the leading hotel. There was enchanting music, excellent food and service and a waiter constantly in attendance not overlooking the minutest detail. Once the manager came by to inquire if everything was all right. There were five in the party and the check was a little over twenty dollars. Later in the evening one of my friends remarked, "That was a whale of a price for a dinner, but I enjoyed it immensely and I guess it was worth it." The next day we were driving to another city one hundred miles distant and stopped on the way for the noon meal. The check was fifty cents each, but the quality and service were accordingly, and another of my friends remarked that such a meal was not worth half the price. The point I want to make is that to my friend the charge of eight times as much in the rathskeller was not excessive as compared to the fifty-cent meal. Is it unreasonable to believe that the same psychology will apply to telephone service, yes even up to eight times as much. At the present time I pay for my residence telephone on a party line $3.65 per month and for my business telephone $9.25. It is true these telephones are connected to a large exchange, but I doubt if they are used many more times each 24 hours than if they were part of a much smaller system. I pay this rate because we have been told it is necessary to the proper conduct of the business. In other words I have been educated up to it and accept it as a matter of course and may I add that it must be worth the price or I would not continue to be a subscriber year after year. It is equally important that the small exchange furnish service that is worth the price, in other words it must earn the charge with a little left over as profit to the subscriber. First put your service in a class second to none, believe that it is entitled to a rate that will properly maintain and operate the system, then brush up your salesmanship and go out and sell your subscribers exactly as I have been sold on the rate for the telephones I am using. It can be done and I can cite you to more than one small exchange that did this very thing more than ten years ago.

BRITISH FIND WOMEN EXCEL IN OPERATING TELEPHONES

London—The British Postmaster General, commenting on the resolution of the Postal Workers' Union against the employment of women as telephone operators, says that the only way to improve the service is to have all women operators. In support of that view he cites the results of a recent test on quickness in response to calls.

Between 8 a. m. and 5 p. m., when women were in charge of the switchboards, the average response time on London exchanges was 6.3 seconds. Between 5 p. m. and 8 p. m., when both men and women were working, the average time was 8 seconds. After 8 p. m., when men only were working, the average was 13 seconds.

The Postmaster General calls attention to the fact that women operators are employed all night in the United States, and he thinks this would be a good practice for England.

NUMBER OF OUT OF TOWN CALLS SOARS

Out-of-town telephone calls are on the increase. President Walter S. Gifford, of the American Telephone and Telegraph Company, in a recent statement to the stockholders, says that the number of long distance messages has continued greater than a year ago, the gain during the second quarter of 1930 being slightly larger than that of the first quarter. Telephone users in this country are now making more than 3,525,000 out-of-town calls daily, which is an increase of 253,000 over the number made each day a year ago. This increase in telephone calls is an indication that the service is good and that given adequate facilities people will avail themselves of the opportunity to talk to their business and social acquaintances both at home and abroad.

Capital expenditures for additional plant facilities to provide service of the highest quality and to meet the continuing and prospective growth of the use of wire communications this year, Mr. Gifford says, have exceeded those for the same period of 1929.

FREMONT TELEPHONE COMPANY PRESSES CASE

Representatives of the Fremont Telephone company, Fremont, N. C., are pressing before the state corporation commission on further evidence on the petition to make the Carolina Telephone company provide physical connection between the two companies at Wilson, N. C.

At a hearing the attorneys for the Carolina Telephone company intimated in examining witnesses for the Fremont Telephone company, that the latter company wants the commission to make a change in routing of messages so that the Fremont company would get a larger per cent of the profits than it is now getting.

This was the second hearing in the telephone case, the other having been held several months ago.

LINE AND DESK

IMPROVED SCREWDRIVER

Perhaps the most used, and at the same time most bothersome, tool in the telephone man's kit is the screwdriver. Just recently there has come on the market a non-skid type screwdriver that is a great improvement over the old type. This new tool has a ribbed blade which prevents slipping and permits all effort to be put into the turning of the screw. With the old style about half of the energy expended is put into turning the screw and the rest in pushing to prevent the blade slipping out of the screw slot. Even rusty and battered screws are turned with comparative ease when the ribbed blade is used. Screws being placed in difficult places where the blade must reach it at an angle will be set much easier with this new style screwdriver. Any telephone man can readily appreciate this advantage.

Placing screws overhead as on a ceiling is always a difficult task with an ordinary screwdriver but with this new style it is not necessary to expend as much pressure upward and the screws are run in with ease.

Slipping of screwdrivers has caused many a serious accident and injuries which have cost telephone companies thousands of dollars. As a safety first measure alone, even if the rest of its advantages are not recognized, this screwdriver should be adopted by telephone companies.

The non-skid blade will last much longer than the ordinary smooth kind due to the elimination of the slip.

Everything considered, this new tool is so far ahead of the old style that it seems reasonable to expect its early adoption by all progressive telephone companies who are interested in good work and safety to their employes. Also

(Continued on next page.)

THE MUTUAL TELEPHONE CO. DESIGNS ITS OWN TRAILER

The unique cable reel trailer, shown in the accompanying picture, is the result of an idea conceived by the late B. F. Huffman. For several years prior to his death in March, 1930, Mr. Huffman served as superintendent of construction of the Mutual Telephone Co., Erie, Pa.

In 1926 the Mutual company authorized Mr. Huffman to purchase a new cable reel trailer. Various makes were submitted for consideration, but none that Mr. Huffman saw fully satisfied him. He was of the opinion that a simpler and more easily operated trailer could be contrived. Finally, in apparent desperation, he sat down to work out on paper his own ideas of what a trailer should embody. The result was a rough sketch which he took to Rogers Brothers Company, Albion, Pa. Recognizing the feasibility of Mr. Huffman's idea, the Rogers Brothers Company seized the plan and set to work on the trailer. By experimentation and the consequent amendment of the original plans, the trailer seen in the picture was finally constructed.

The basic idea in this type of trailer is the use of the pulley system in raising the heavy, cumbersome cable reel to its saddle or riding position. The trailer is of four-wheel construction, patterned in much the same style as a tank. In receiving a load, the trailer is backed to the reel. The spindle is passed through the reel and locked in a carriage on each end. The carriage, in turn, is pulled up its track by a strong cable, which passes over a pulley at the top, and is wound around a windlass. The windlass is locked by a ratchet-wheel and pawl. Therefore, a man on each side merely has to wind the crank until the reel is at the desired position. To unload the reel the process is simply reversed.

The utility of such an arrangement can be readily seen. Two men can easily operate the loading or unloading of the reel without physically exerting themselves to any great extent. This trailer also eliminates two objectionable features of the two-wheel type of carriage. In the first place, the inconvenience of having to tip a long tongue awkwardly into the air is removed. The value of this is appreciated when the reels are in rooms with low ceilings. Secondly, the trailer does not necessitate the use of a truck in raising the reel to its riding position.

Another advantage in this type of trailer, and a point which was perhaps uppermost in Mr. Huffman's mind in his dissatisfaction of the trailers shown him, is the fact that it can not buckle. The tremendous strain of raising a heavy reel to its saddle was oftentimes more than the tongue (which has to act as a lever) of a two-wheel trailer could withstand.

Safety in loading and unloading is absolutely assured. As has been explained, each windlass is locked by a ratchet-wheel and pawl. In addition to this, after each carriage, in which the spindle is securely locked, is in place, a plug is locked in a hole in the track directly behind the carriage. This measure of safety prevents the carriage from sliding out of position in case the cable to the windlass breaks.—Contributed by William T. Stout, Mutual Telephone Company, Erie, Pa.

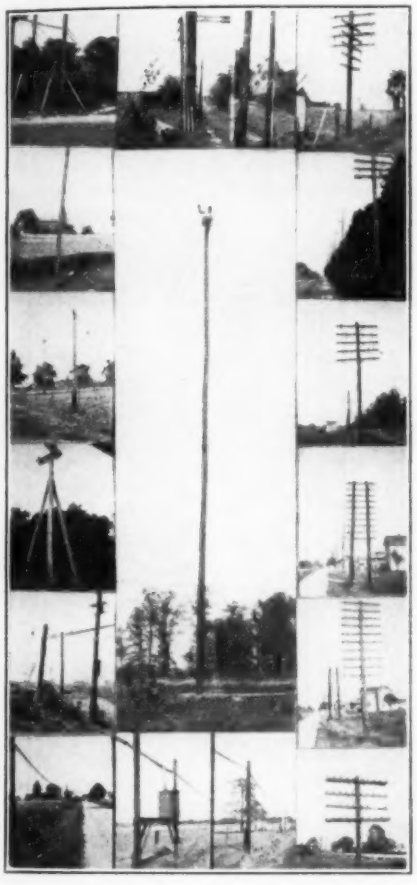
Left shows trailer built in 1921 by the Mutual Home Company of Erie. Center and right show trailer now in use. Trailer has capacity of ten tons and was built by the late B. F. Huffman.

it will help maintain good relations with their subscribers for the slip of a screwdriver has made many an enemy for the telephone company.—Submitted by Ray Blain.

TELEPHONE LOOKIEGRAPH

By Ray Blain

On July 9th the underground conduit system between Kansas City and St. Louis was completed. At first thought some might believe that the use of poles



Is the use of poles diminishing? Look at this Lookiegraph of Ray Blain's and guess the answer.

and aerial lines would soon be discontinued, so we took the trusty camera and went out to investigate and attempt to prove otherwise.

Before we got out of town we found a fine example of telephone engineering and construction skill where fine treated poles were used to support messenger which carried heavy cables across a river. These cables were suspended on double messengers with heavy and numerous guys holding the deadend poles where the cables went underground.

Next we found a good pole well placed holding a buckarm where a two pole corner was impossible. Then a good picture of some high poles carrying a heavy toll lead over a grove of trees. Driving along this lead we came to a junction where we picked up five additional cross-arms. This lead was a wonderful sight and two 45′ treated poles formed an "H" fixture that would gladden the heart of any telephone man. We arrived next at a railroad crossing and paused to note the telegraph lead on short twenties and one could stand on the ground and almost reach the lower arm. The real advantage of this type construction is that it keeps the lines down where they are not subjected to the full force of the elements. From here we went over to look at a new toll cable strung straight across country paying no attention to the roads. This was a fine lead with class "A" treated poles, load coil fixtures at fixed intervals and showed to advantage the skill of the construction force. Driving back to town we found a push brace corner, or as some call them "Stiff-Legs" on a corner where room for guying was not possible. It was the first corner of this type we have noticed for years.

It was a pleasure to note that real poles are now being used on rural lines which is quite a contrast to the ones generally used for this purpose a few years ago. Rural line service is getting better.

The crowning glory or the king of poles was a straight 90′ treated stick used to support one end of a radio antenna. We were of the opinion that in this day of short poles no high linemen were left but to relieve our fears an accommodating long legged lineman perched himself on the roof while we snapped the last film in the pack.

Thus ended a perfect day, for we had proved that there is no danger of poles being discontinued and that real linemen are not a thing of the past. While underground is a real advantage in many locations, there are numerous others where aerial will prove in. Treated poles with an average life well over thirty years, copperweld and galvanized messenger and pole hardware makes aerial construction more desirable than it was with materials available some years ago. Poles no doubt will prove an important part in our telephone systems of the future as they have in the past. Personally we would hate to see it otherwise, for without them it would not have been possible to develop our present International telephone system for they carried numerous circuits overhead before cables to lay beneath the surface were possible.

Yes, we believe that as long as we have telephones we will have wood poles and as long as we have poles we will have linemen to climb them. We would hate to see it otherwise because we are an old lineman.

A $50,000 improvement program has been launched in Bluffton, Ohio, by the Bluffton Telephone Co. since it has been taken over by the Utilities Service Corp. of Ohio.

Safety Last

By The Undertaker

Telephone linemen as a rule consider their belt and safety as they do their pipe—that it improves with age. Naturally a belt that has been in use for a period longer than its natural life is sure to weaken as leather will only last so long. When using a belt of this kind there is every possibility that it will let a lineman fall some day from a pole, but concrete as a rule is not very hard, and you might fall on a passing automobile, so this need not be considered seriously. When one has a belt break he generally gets a lot of publicity in the local papers, and, if killed, a nice obituary notice and a lot of kind things said about him. There have even been a few cases where a dead lineman got flowers, but this is not generally considered good taste. Then, if the fall does not kill outright, the ambulance will take you to the hospital—which is always a nice ride—and there you will lay for days, weeks or months with nothing to do while flesh and bone are mending, and you may have a pretty nurse to pull off adhesive tape.

Some companies follow the foolish practice of examining their linemen's belts at fixed periods and, if they show any signs of weakening, require that new ones be provided. In rare cases linemen have been known to refuse to use a belt that was plainly unsafe. For some reason many companies can't see the advantage of a man taking a double somersault from the top of a pole and landing on the sidewalk with all of its numerous possibilities. Yours for more dents in accidents.

FEW RIGHTS LAPSING ON A. T. & T. STOCKS

With more than 280,000 subscribers to the stock offered recently by the American Telephone & Telegraph Co., it is estimated that the number of rights allowed to lapse will not exceed the one-third of one per cent unsubscribed in 1928.

The number of subscriptions made under the single payment plan is about 77 per cent, compared with 7.8 per cent in 1928, and the number under the installment plan is 23 per cent. Of the total shares subscribed for about 81 per cent were under the single payment plan, against 83.8 per cent in the previous offer. The average number of shares for each subscription was 9.2, compared with 6.99 in 1928.

The amount of cash which has been received in connection with these subscriptions totals approximately $225,000,000.

Line Testing From Headquarters

Advantages of Direct Reading Test Cabinet for Determining Resistance and Locating Short Circuit Explained by E. S. Stewart of Stewart Brothers, Ottawa, Illinois

The ideal condition in a telephone exchange when considering maintenance is to know when a line is free from all trouble and, still more important, to know when a line is in trouble and what the trouble is.

When trouble is known to be on a telephone line the most important thing to know is how to repair the line quickly, and at the greatest possible saving of time and distance traveled.

The writer will endeavor to explain just how the repairman can, by applying the following method, determine first that the line is clear or in trouble and if in trouble, just what the trouble is and where it is.

A direct reading test cabinet designed to give the best results for this class of work is shown in the sketch, Fig. 1, and operates as follows:

When connected as shown in Fig. 1, it is ready to perform the kind of testing that is met with in the small telephone exchange.

The test cabinet is connected to a jack on the switchboard so that by using a cord with a plug on each end, tests can be made on any line simply by plugging one end of the cord into the test line, and the other end into the line to be tested. Other cords and plug or shoe attachments can be added as shown, to suit your convenience.

The test cords and snaps are to be used for testing the resistance of telephone parts. Simply connect the snaps to the part to be tested, press key marked "Short," and the needle will indicate the correct resistance on the dial.

With the telephone as shown, one can ring out onto the line connected to the test line, can talk to the subscribers, and receive their incoming rings.

There are eight No. 6 dry cells which will give about two years of service, making the total operating cost of the cabinet about $1.60 per year. For the convenience of the tester, the dial on the meter is arranged to show the resistance of all readings in ohms, whether testing to short cross or ground.

The keys are arranged so that by pressing one key at a time a short, cross or ground can be read in ohms.

The direct reading test cabinet can now be applied to locate a short circuit on the line as shown in Fig. 2. This will show how very much simpler it is to locate trouble when the resistance to that trouble is known.

Before going further, let me suggest that the only good method of using any test cabinet or board is to test out and make a chart or card of all lines on the exchange and know what they read when they are O. K. and clear. It is a simple matter to mark down the resistance to ground and across the line on the line record. If you do not do this, you should at least know just what each kind of line on your exchange reads in ohms when clear.

The line shown in Fig. 2 will read 610 ohms when clear. The cable on this line measures 45 ohms per wire and the line runs 30 ohms per mile. The resistance of the bells is 1600 ohms each.

The short of the bells across this line is found by dividing the resistance of one bell by the total number of bells that are across the line, as follows: 1600 divided by 10 = 160 ohms. This method of finding the resistance of bells in multiple across a line always holds true. When the resistance of the cable and line wire as well as the resistance of the bells is

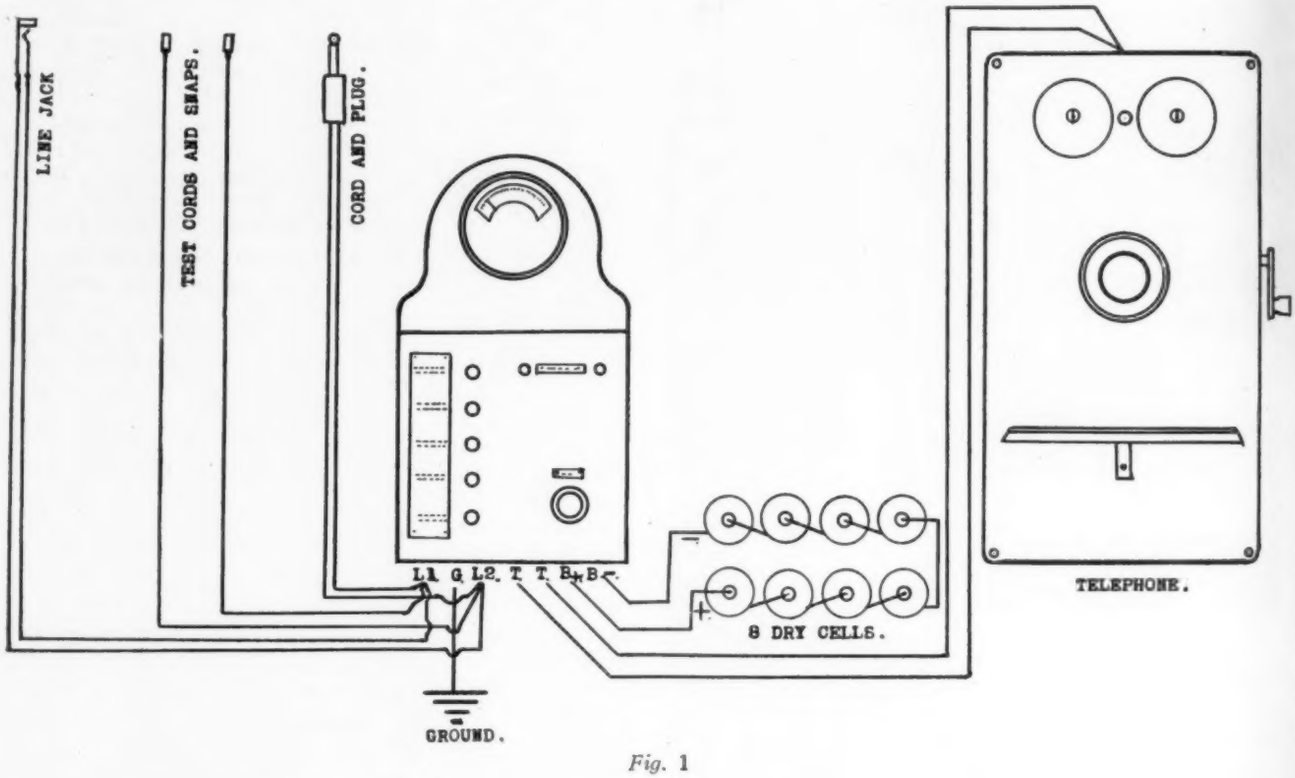


Fig. 1

THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY PAYS ONLY A REGULAR, REASONABLE DIVIDEND TO THE 500,000 OWNERS OF ITS STOCK

They use it, they believe in it, they own it

An Advertisement of the American Telephone and Telegraph Company

THE Bell Telephone System is representative of the new type of ownership in American business, and of the responsibility to further the nation's welfare and prosperity which such an institution accepts.

Some 500,000 men and women, in nearly every town and city in the country, own the stock of the American Telephone and Telegraph Company. The average number of shares per stockholder is thirty. No single individual owns as much as one per cent of the total capital stock. The company pays only a regular, reasonable dividend, which it has not missed paying since its incorporation. Earnings beyond that go into the extension and improvement of the telephone service.

The Bell System is an American institution which consistently builds ahead of the communication needs of the day and year. Its construction program for 1930 requires the expenditure of approximately 700 million dollars.

The scope, speed and accuracy of its service is dependent on the constant research of more than 5000 scientific workers, new methods of operation and construction, and the co-ordinated efforts of more than 450,000 widely scattered employees.

All its efforts are centered on giving the public a steadily improving telephone service at the lowest possible cost. This is the accepted responsibility of the Bell System.

added, you will have 610 ohms.

The black needle on the dial, Fig. 4, shows where the needle will stop in case of trouble. If the line was clear, the needle would stop as indicated by the dotted needle.

We will say that this line shows 330 ohms to short. As the cable is known to be 90 ohms, the resistance to the trouble from the end of the cable will be 330 ohms less 90, or 240 ohms.

By looking on the mile chart, Fig. 3, and reading 240 the trouble is known to be out four miles. This can be proven by adding the resistance of the cable and the line to the trouble, both wires, which will equal the dial reading.

Short on No. 12 E. B. B. Wire

Ohms	Miles	to trouble	from	cable	box.
10	1/6	"	"	"	"
20	1/3	"	"	"	"
30	1/2	"	"	"	"
40	2/3	"	"	"	"
50	5/6	"	"	"	"
60	1	"	"	"	"
80	1 1/3	"	"	"	"
100	1 2/3	"	"	"	"
125	2 1/12	"	"	"	"
150	2 1/2	"	"	"	"
175	3	"	"	"	"
200	3 1/3	"	"	"	"
250	4 1/6	"	"	"	"
300	5	"	"	"	"
400	6 2/3	"	"	"	"
500	8 1/3	"	"	"	"

Fig. 3

The mile chart shown as Fig. 3 gives 4 1/6 miles for a reading of 250 ohms and as the trouble is 240 ohms, it will be slightly less than this distance, 4 miles to be exact.

If this line was grounded and not short at this point, you would look on the chart for grounds on this size of wire.

To make this method complete and to save figuring each case of trouble, a chart is furnished for short circuits and grounds for all sizes of wire.

It takes about three hours' time to install this type of test cabinet and once put into service you can check over your lines and know their exact condition after a storm or bad weather.

For testing on bench work this type of cabinet will check all coils and parts of telephone and switchboards, and is a great aid in putting telephones back on the shelf in perfect order.

With the cabinet connected to a test line, as shown in the sketch, you can test any cord on the board by plugging it into the test line and noting the readings on the cabinet. If the ring off coil or the repeating coils can be tested in this way.

The meter on the cabinet is so arranged that it will read volts as well as resistance.

Anyone operating telephone exchanges where men are not located, can save time and expense by installing a test cabinet of this type at the isolated exchange. In this case, keep the line record at the same office where the men are located. With this arrangement the operator can report the readings that she gets on the line in trouble to the man in charge and he can route the trip the shortest way to the trouble.

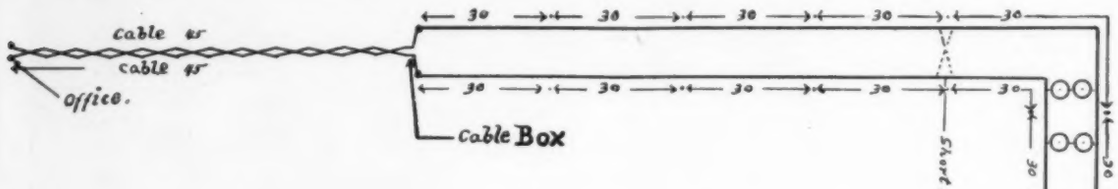


Fig. 2

One of the best values in a test cabinet of this type is that in cold winter weather the distance to the trouble can be determined from the office where it is comfortable and in this way protect the repairman and also save considerable on the car, as the most expensive trips are made in cold weather over bad roads.

This type of test cabinet can be operated by anyone who can read the simple instructions that are furnished with the cabinet.

Further information will be gladly furnished on request by Stewart Brothers, Ottawa, Illinois.

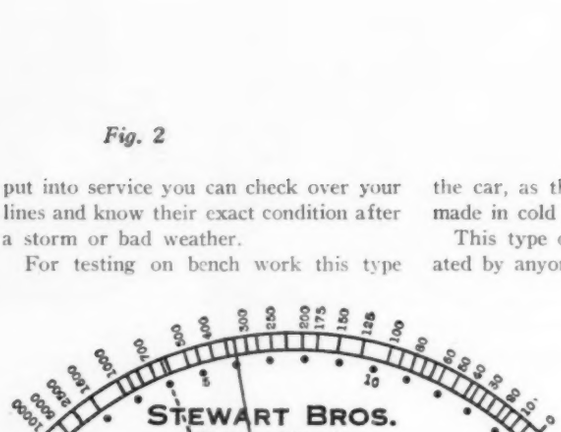


Fig. 4

TELEPHONE ORGANIZATION CHOOSES HEADQUARTERS

Greenville, Ohio, has been chosen at the site for the main offices of the proposed Southwestern Ohio Telephone Company, provided the merger is approved by the state public utilities commission.

The merger involves five phone companies, including the one at Hollansburg, with a total valuation of over $500,000. In addition to the consolidation plan, the application asked permission to issue $200,000 in first mortgage bonds, $200,000 in voting debentures, and 1,000 shares no par common stock.

The companies and their appraised valuations were: The Eaton Telephone Company, $228,890; the Camden Telephone Company, $70,420; the New Paris Home Telephone Company, $59,366; the Eldorado & West Manchester Telephone Company, $112,689, and the Hollansburg Home Telephone Company, $39,205.

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Northwestern Bell to Petition Interstate Commerce Commission to Acquire Tri-State Property in St. Paul, Including Four Suburban Exchanges

Application will be made to the Minnesota Railroad and Warehouse Commission and the Interstate Commerce Commission by the Northwestern Bell Telephone company, for permission to acquire the telephone system in St. Paul, according to company officials.

The St. Paul system is at present owned by the Tri-State Telephone and Telegraph companies. For many years the two telephone systems in St. Paul and Minneapolis were competitive, with both Bell and Tri-State operating exchanges in each city. Some years ago an exchange of properties resulted in the Bell company acquiring Minneapolis as its exclusive field and the Tri-City operating in St. Paul.

The transaction, if granted, will affect the metropolitan area of the city of St. Paul and four tributary exchanges, while the remainder of the Tri-State Telephone and Telegraph property, will be retained by the Gary interests, which has the present control.

The following statement has been issued by President G. W. Robinson, of Tri-State Telephone and Telegraph company, in connecton with the proposed transaction:

"I am pleased with the proposal of the Northwestern company to acquire control of this property. It will assure a permanency of ownership that will be desirable. It will mean a stability and continuity of management policies that will be in the interests of satisfactory telephone service.

"More than ten years' observation of separately directed and operated telephone services in St. Paul and Minneapolis, and experience with the management of the St. Paul property during that period, has convinced me that both should be under the same control. Only in this way can there be effective co-ordination of the various technical features of the business which is so essential to satisfactory telephone service.

"The Northwestern company, as a part of the Bell system, is able to take full advantage of the technical resources and inventions available to all Bell system companies. This is particularly advantageous in the providing of telephone service in such a large center as St. Paul and Minneapolis.

"The Northwestern Bell company has a fine record of outstanding management. It is in a splendid position to serve satisfactorily the telephone needs of the St. Paul area."

The Gary interests have had control of Tri-State Telephone and Telegraph company only since last year, when they purchased it from St. Paul banking interests, who had in 1928 taken it over from large financial interests in Pittsburgh. That former owners of the telephone property would not object to the transaction was indicated by E. C. Blomeyer, executive vice-president of Theodore Gary & Co., who said:

"Former controlling owners of the Tri-State company as well as the principal executives of the company itself, have for years recognized the fact that operating, technical, or other economic conditions arising out of the proximity of the two Twin Cities would at some future time make it impracticable from an operating standpoint for this metropolitan area to be efficiently served by two separate telephone companies.

"From our experience with the company since we became interested in it, it is clear that, because of the rapid growth of the area, this time will arise much sooner than might have been anticipated, and on this point the operating executives of both the Tri-State and Northwestern companies handling the St. Paul-Minneapolis area agree.

"With that condition existing, it is also clear that if the two cities must some time be unified, it is to the advantage of all interests concerned that it be done as soon as possible, because operating and other questions jointly affecting the two cities are arising daily and are, because of the growth of the cities, becoming more and more difficult to settle from an economic operating standpoint when the properties are operated by two separate companies.

"Further, each company has now before it a large program of extensions and buildings, affecting altogether practically the entire St. Paul-Minneapolis area; and this program should naturally be carried on as a unified proposition, which can be done only if the entire area is under one management.

"The transaction affects, of course, only the St. Paul exchange area. The remainder of the extensive properties of the Tri-State company, as well as the Dakota Central Telephone company and some seven other companies subsidiary to the Tri-State company, will continue permanently under control of the Gary group."

Announcement has also been made that the Gary group will maintain offices in St. Paul as headquarters for its properties in Minnesota and the Dakotas. These properties will continue under the management of the present officers of Tri-State Telephone and Telegraph company.

NEW LONG DISTANCE LINE TO CHICAGO

The opening of a direct telephone circuit to Chicago has been announced by V. B. Fitzpatrick, general manager of the Chesapeake & Potomac Telephone Company of West Virginia.

The new line will speed up service on calls between Charleston, South Charleston, Dunbar, Kanawha, St. Albans, Madison, Clendenin, East Bank, Montgomery, Oak Hill, Fayetteville, Thurmond, Mt. Hope and Beckley and the Illinois city.

PURCHASE OF TRI-STATE WILL NOT AFFECT EMPLOYES

Purchase of the St. Paul and suburban lines of the Tri-State Telephone company by the Northwestern Bell Telephone Company will in no way affect the 2,200 employes of the Tri-State concern, it has been officially announced.

The 1,200 St. Paul employes of the purchased company will be retained by Northwestern Bell to operate those facilities, while the 1,000 employes in rural districts, whose operations will come under control of a new company to be formed by Theodore Gary & Company of Kansas City, also will be retained.

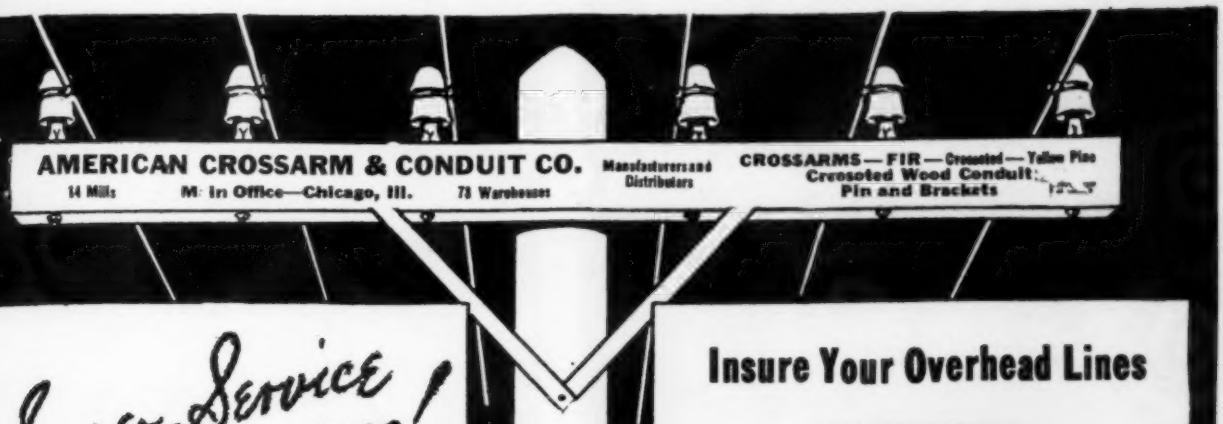
Officers to Be Retained

Present officers of the Tri-State company probably will serve in executive capacities with one or the other of the two concerns. These include George W. Robinson, president; C. B. Randall, vice-president and general counsel; George K. Gann, vice-president and operating manager; A. C. Craig, secretary and treasurer; R. F. Wilder, superintendent in charge of operations outside the St. Paul area, and L. O. Painter, superintendent of operations within that area.

The addition of the Tri-State Telephone & Telegraph Company to the American Telephone & Telegraph system, of which Northwestern Bell Telephone Company is a constituent company, marks the largest single acquisition in recent years by A. T. & T.

Assets of the Tri-State Telephone & Telegraph Company at the end of 1929 totaled $28,151,255, of which plant and equipment was carried at $21,281,271.

The company has outstanding 100,000 shares of no-part common stock of an authorized issue of 200,000 shares and 6,392,090 shares of 6 per cent cumulative preferred stock of $10 par value.



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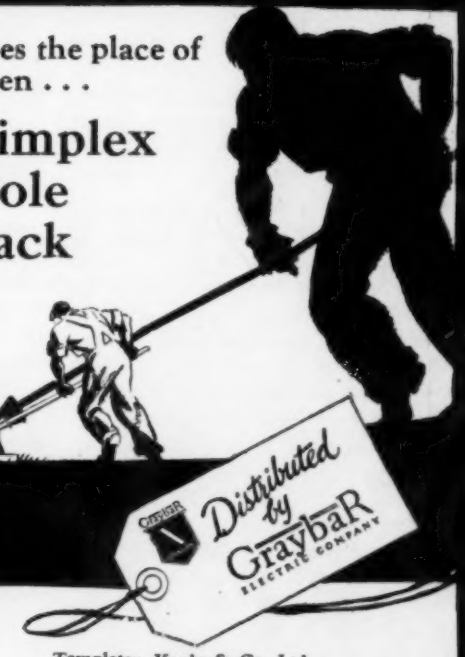

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Ramblings

W. C. Dillon, former telephone man deluxe, but for the past year with the Diebold Safe company of Canton, Ohio, where he has been locked in the laboratories for more than ten months, is back in Chicago as the sales representative of that concern. Dillon is an inventive genius and has made bank protection his hobby for the past twelve years. His work with the Diebold Safe company was assisting in the perfection of the burglary alarm attachment to the vault doors for banks. This work involved the newer idea described in these columns some time ago where the shadow of a person walking in front of the vault door would set in motion the apparatus which would in turn give the alarm.

* * *

Dillon hailed from Texas where he was manager of the Corsicana Telephone company some twenty years ago. Corsicana was the first town in Texas to discover oil; that same town was the home of Roger Q. Mills, one of the greatest men to enter the United States senate. He tried to mix oil and politics, but it wouldn't work and he was retired. In ancient history we read where a person when selected as a ruler of his people was anointed with oil. Possibly this was where Mills got his idea—but the modern mixing wouldn't do. Later on Joseph W. Bailey, another brilliant senator from Texas, was anointed with the wherewithal from oil, and he lost his power—just as Samson did when he visited the barber. Dillon failed to "get his feet wet" as the oil expression in Texas goes, so he had to keep on plugging for a living.

* * *

W. F. Qualls, a former representative of the Monarch Telephone company of Fort Dodge, Ia., is now located at South Bend, Indiana, and is connected with the city in the capacity of engineer. He is directing the fire alarm and traffic signals of that city; so if you drive through that city and get held up by the stop, start, gee, haw system just lay it to one of those misguided fellows who got his early training in the telephone manufacturing and sales end of the business. Qualls has several inventions to his credit which are proving popular. For fear that we will turn traffic through South Bend about noon-time each day, we are going to refrain from telling about that very excellent lunch he invited the wife and the writer to partake of recently.

* * *

W. H. Govett, representing T. J. Cope, Inc., of Philadelphia, spent the entire month of August on a business and pleasure trip through several states, making Chicago and surrounding cities while in this section. Mr. Govett was accompanied by his wife and they made the entire trip by automobile, spending several days in Chicago. He expressed himself as well pleased with business conditions over the country, stating that his advertising campaign in Telephone Engineer was proving profitable.

* * *

"They Had to See Paris." Frank McKinney, secretary of the Ohio Independent Telephone Association, accompanied by his wife, spent two months in France, England, Germany and other countries of the old world during the present summer. They are back home and Frank is more impressed with the United States than at any time in his life. We are not saying that Frank was ever displeased with our Uncle Sam, nor is not 100 per cent US, but the conditions he found in the countries visited convinced him anew that he is living in God's chosen country.

* * *

Rambler spent Labor Day in Washington and visited with old Texas friends who are on Uncle Sam's payroll in that great city. While they are not telephone men, Rambler was associated with them in a business way back when he played the "devil" in a print shop owned by Geo. M. Roberts at Mt. Pleasant, Texas. Roberts has been in Washington for many years and carries the title of superintendent of Weights, Measures and Markets of the District of Columbia. Another friend and former employe was Charles M. Chuch, who graduated from a printer in Fort Worth and is now in the Government printing plant at Washington. Neither were asked to cash a check for Rambler, so we are still good friends.

* * *

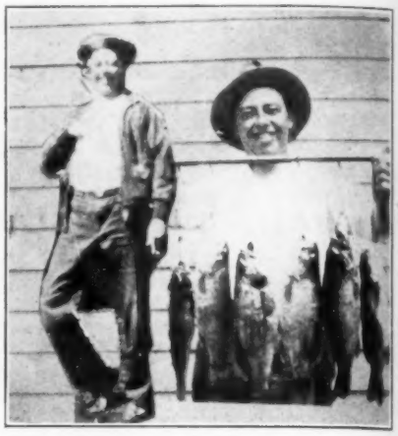
Over at Fort Wayne, Indiana, we found the ever energetic bunch of the Home Telephone & Telegraph company as enthusiastic as ever and very optimistic over the outlook. Manager Marahrens stated that while his records showed a loss of subscribers during July and August, the proportions were not as great as in Toledo and other cities where a greater percentage of day labor was employed.

* * *

Theodore Gary & Company annexed another mighty good man to its organization when they secured the services of Geo. K. Gann, former vice president of the Tri-State Telephone & Telegraph company. Mr. Gann will have his headquarters in Chicago. He had an active part in building up the Continental Telephone company, which was acquired some time ago by the Gary interests.

ANOTHER FISH STORY FOR THE BOOKS

According to the above pictures, F. Howard Waite, of F. Howard Waite, Inc., Cleveland, Stromberg-Carlson representatives, is quite a fisherman and he seems glad to let one know it, too, but



F. Howard Waite, Stromberg-Carlson representative in Cleveland, showing the crowd the "big catch" he claims he made in Lake Oneida, N. Y. Photo to the left shows Mr. Waite in one of his happy moods.

a little light has been thrown on the subject which might contradict the old adage, "Pictures don't lie."

Mr. Waite vehemently alleges that the bass are honest-to-goodness fish that he caught on Lake Oneida, New York, but O. E. Gibbs, Stromberg-Carlson representative in Toledo, declares that when he was on that lake he remembers posing for a photo with a string of stuffed bass provided by the photographer.

Mr. Gibbs says he will go on his oath that the fish Mr. Waite is pictured holding are the very same ones that he posed with several years ago—and, furthermore, the same net.

We don't know on which side to stand and all we can say is "Just another fish story for the books."

SOUTHWEST TELEPHONE CO. IMPROVING ITS EXCHANGES

Oklahoma City.—The Southwest Telephone Company, with 35 exchanges in Oklahoma, has recently improved its exchanges at Hollis, Frederick, Texola and Loveland, according to D. T. Strickland, Dallas, vice-president. At Hollis 40,000 feet of cable and other improvements have been installed. At Frederick, approximately 12 miles of metallic rural lines have been built. Additions have been made to outside plant at Texola, including construction of 3,000 feet of new cable. New central office equipment and a new switchboard have also been installed at Texola. The plant at Loveland has been rebuilt, including the placing of 1,500 feet of cable and the metallicizing of present grounded lines.

The Stewart Direct Reading Test Cabinet

Why not know just what the trouble is and where it is without figuring?

The Stewart Test Cabinet is the only test cabinet on the market that will tell the exact resistance in ohms to shorts, crosses and ground directly off the dial of the meter.

After once installed it costs less than Two Dollars a year to operate one.

A chart is furnished giving the distance to trouble on all kinds of wire generally used.

Sent on 30 days' trial. Price 15-volt dial $56.00, 150-volt dial $61.00.

We also make Detecto-Meters and Cable Testers as well as the new Stewart test set that tells distance and direction to trouble on the line without cutting a wire. It is equipped with Detector Coil.

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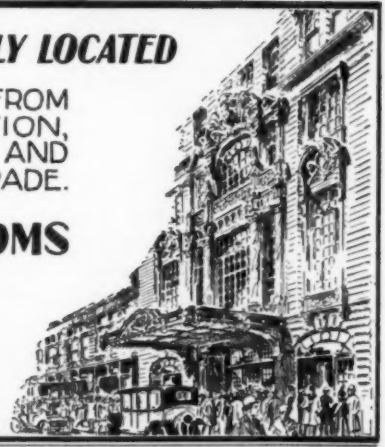

CHICAGO

News From the Field

An expansion program for Kentucky States Telephone Company, involving expenditures of a quarter million dollars, has been announced by Millard F. Cheek, president. The program, which will occupy the remainder of 1930, calls for construction of 250 miles of toll lines and rebuilding several exchanges.

Decline in cable business, curtailment of foreign telephones, extensions and reduced domestic business, will affect earnings of International Telephone & Telegraph this year, according to the Wall Street Journal, which estimates that between $2 and $2.50 a share will be shown.

Following an investigation into its intrastate toll rates by the Public Service Commission, the New York Telephone Company has announced that a revised schedule is in preparation, which will place the company's rates in conformity with those of the American Telephone & Telegraph Company. The revised rates are to be effective October 1.

The use of the telephone in train dispatching is growing steadily. Because of the increased efficiency in handling train operations with the telephone, a dispatcher can manage a longer length of line than is possible by telegraph. Through the use of portable sets, section men, bridge and building gangs at work along the right of way can also keep in constant communication with headquarters.

Expert workmen who have been busy for the past two months installing new equipment for the Bellamy Telephone Co. switchboard, Bellamy, Iowa, have completed their work. The new improvements have cost more than $15,000.

The Illinois Bell Telephone Company has been granted a 23-year franchise by action of the Chicago city council. Under provisions of the ordinance, the franchise will not expire at the end of 23 years but will continue in force, subject to six months' written notice either by the city or the company.

The Indiana Bell Telephone Company has workmen in Danville, Ind., making improvements and extensions to the lines of the plant. The program calls for the erection of 500 new poles and the stringing of about 50 miles of new wire.

Because of the drought and other unsatisfactory conditions, the Indiana Public Service Commission has decided to defer the rate increase petitions of the Southern Indiana Telephone & Telegraph Company and the Ladoga Telephone Company for ten months.

Sinto, Tex., soon is to have a new $10,000 brick telephone exchange building. The Southwestern Bell Telephone Company has awarded the building contract to the Wood Sherman Construction Company of Corpus Christi, Tex.

Citizens of Jamestown, Pa., having complained that a 25-cent charge for a monophone is excessive, the Pennsylvania Public Service Commission is considering the rates charged by the Jamestown Telephone Corporation.

Headquarters for the Illinois Bell Telephone Company at Aurora, Ill., have been moved from 33 Island avenue to the new telephone exchange building at 83 Stolp avenue.

At the opening of the new Bell Telephone building in Holland, Mich., connection was made with The Hague over the new 5,000-mile circuit, and several persons conversed with U. S. Minister Diekema. It was the first message sent over the new system.

The United States has upward of 20 million telephones. The rest of the world has but ten million. Germany comes next to the United States with three million.

Winthrop W. Aldrich, president of the Chase National Bank of New York, has been elected a director of the American Telephone & Telegraph Company, to succeed W. Cameron Forbes.

There are three periods of the day when the telephone normally is used to the greatest extent. In the morning around 10 o'clock, in the afternoon around 4 o'clock, and again shortly after 7 o'clock in the evening.

The new American Telephone building in Horton, Kans., is fast nearing completion, according to C. N. Wilson, contractor. Work is being rushed on the special panel board which is to be installed in the Horton office so that it may be installed immediately following the completion of the building.

The placing into service of two additional long distance telephone circuits between Sturgeon Bay, Wis., and Chicago has been announced by Manager L. R. Meverden of the Wisconsin Telephone Company. The circuits are 28 miles long. Twenty-four-hour service is obtainable over them.

The Bell Telephone system purchased more than $11,638,000 of materials and supplies in the southeastern states last year of which more than $4,000,000 of this sum was spent in the state of Mississippi.

A new test panel for testing out toll circuits has been installed by a representative of the Illinois Bell Telephone Company in the switching room of the Geneseo, Ill., exchange.

The International Telephone & Telegraph Company has reduced the press cable rate between the United States and Denmark, Estonia, Finland, Latvia, Lithuania and Sweden, to conform with the schedule recently announced by the Western Union Telegraph Company.

The Milford Chamber of Commerce, Milford, Mass., has passed a resolution disapproving new abbreviated telephone directories issued by the local branch of the New England Telephone & Telegraph Company. Objections are based chiefly on the fact that economic interests may be affected by the failure to list contiguous towns in the directory.

The International Standard Electric Corporation, manufacturing subsidiary of the I. T. & T., has increased its capitalization from 500,000 to 1,000,000 shares of no par value.

J. T. Turner, manager of the West Frankfort exchange, West Frankfort, Ill., has been selected as exchange manager at Benton, Ill., to succeed Norman Benson, for the past five years manager of the Benton exchange, who has been transferred to Lincoln. While making his home in Benton, Mr. Turner will direct both West Frankfort and Benton exchanges.

The Republican Valley Telephone Company has announced that calls to telephone exchanges in Franklin county, Nebr., with the exception of Macon, Riverton, Bloomington in Franklin county, and Reabsville, Kans., will be charged long distance tolls. Subscribers in the vicinity have protested. Unofficial appeals to the railway commission at Lincoln have elicited information that the telephone company was unauthorized to make such charges.

W. D. Ford has been appointed assistant manager of the Oak Park district of the Illinois Bell Telephone Company to succeed H. W. Beecher, who has been appointed district commercial manager of the Danville district, Danville, Ill.

Preliminary plans have been made to build a new Northwestern Bell Telephone exchange in Shenandoah, Iowa. The building, as proposed, will be 36½ feet by 57 feet 10 inches.

Bangor, Maine, city officials are endeavoring to have the dial system placed throughout the city hall.

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GALVANIZED PRODUCTS

Telephone and Telegraph Wire
- Extra Best Best (EBB)
- Best Best (BB)
- Steel

Seven Wire Steel Strand
- Standard
- Siemens-Martin
- High Strength
- Extra High Strength

Crapo Galvanized Products combine *every* element essential to long life and low maintenance cost: pure zinc coatings, *non-cracking, non-peeling*—correct tensile values—proper ductility.

Immediate shipping service from Distributors' stocks in all jobbing centers.

Manufactured Exclusively by
Indiana Steel & Wire Co.
Muncie, Indiana

SIMPLIFY YOUR SOLDERING

No waste motions in using Kester Flux-Core Solders. No separate application of flux—it's right in the core. In Rosin-Core, the solder generally approved by telephone authorities for delicate wiring, the plastic flux is most active. Does not deteriorate and prevents corrosion and electrical leakage.

Use Kester Acid-Core for heavy duty and outside work, for iron line drops, etc. There's a Kester Solder for every soldering purpose. Our Research Department is always at your service to solve your soldering problems—without obligation.

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Incorporated 1899

Made From Ohio River Fire Clay

Ohio River Fire Clay has long been recognized as superior for products where strength, and long life are required.

VITRICLAY conduits are the only duct made from this famous clay.

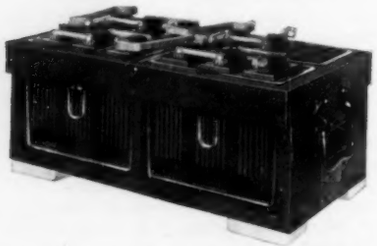
THE KAUL CLAY MANUFACTURING CO.
TORONTO, OHIO

With Manufacturers and Jobbers

SEALED GLASS JAR BATTERIES, TYPE BTE, JUST OUT

The Exide battery, type BTE, in sealed glass jars, is a recent development of the Electric Storage Battery Company. It is particularly adapted to telephone services such as magneto, PBX, and small common battery switchboards.

This battery is assembled in a three-



The new sealed glass jar Exide battery

compartment glass jar unit of rugged construction, and mounted in a wood crate painted with acid-resisting paint, equipped with pressed steel handles and porcelain insulator skids.

An 11-cell battery of this type consists of four three-cell units, in one unit of which one compartment is blocked out, and sealed with a painted wooden cover. Two different assemblies are provided, i.e., either in two crates or all in one crate, in order to conform to different installation requirements. This battery is available in two sizes of the capacities stated below, and each 11-cell battery has one of the units equipped with pilot balls to give a rough indication of the state of charge.

Low gravity electrolyte (1.220 specific gravity) is used. This lengthens the life of the battery. Generous sediment space is provided below the plates. The terminal cells are equipped with bolt connectors for making external connections. The units in each crate are connected with lead tape, which is also used for connecting the units of the two-crate assembly.

Each crate is provided with skids which allow a free circulation of air under each unit, and insulates it from the floor or shelf on which it is mounted. The spray-proof vents, with which each cell is provided, permit of the battery being located in the same room with the telephone switchboard and other apparatus. The battery is furnished filled with electrolyte and charged, ready for service. Further information will be furnished by the Electric Storage Battery Co., Philadelphia, Pa.

AUTOMOTIVE COOLING SYSTEM MANUAL

The general service division of the National Carbon Company, Inc., makers of Eveready products, will shortly release a complete automotive cooling system servicing manual which is a compilation of the findings of their automotive research laboratory from field and laboratory tests over a period of years.

The new manual is intended primarily for the information of service men, and will preesnt complete data for the servicing and maintenance of automotive cooling systems and will include a question and answer section concerning antifreezes which should prove of value to all dealers who sell these products.

The various necessary steps to efficiently clean cooling systems by pressure flushing, using various cleaning agents, are presented, along with timely hints and the best known methods of maintaining the cooling system at its highest point of efficiency.

The new manual, as well as the recently announced new Eveready Prestone, will shortly be in dealers' hands and the company announces that extra copies are available and may be procured from any of the company's offices which are located at 10 East 40th street, New York City; 230 North Michigan boulevard, Chicago, Ill.; 910 Baltimore avenue, Kansas City, Mo., and 8th and Brannon streets, San Francisco, Calif.

WORLD'S SMALLEST SYNCHRONOUS MOTOR

What is believed to be the world's smallest synchronous electric motor is shown by C. E. Skinner, assistant direc-

Puzzle: Find the motor

tor of engineering for the Westinghouse Electric & Manufacturing Company. About the size of a hickory nut, it runs on ordinary house current. Its rating is approximately one-half cricket power.

This motor is used in delicate devices which require a constant speed with very little power.

STROMBERG-CARLSON DECLARES EXTRA DIVIDEND

Directors of the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., declared the fourth consecutive extra dividend on the stock at their last meeting.

The directors declared the regular quarterly dividend of $1.525 on the preferred and the regular quarterly dividend of 25 cents and an extra of 12½ cents on the common, both dividends being payable on September 1 to stockholders of record at the close of business August 16. In 1927 and 1928 only one extra dividend was paid. In 1929 extra dividends were paid on March and December 1 and so far this year there has been an extra of 12½ at each dividend rate, which means that the company's stock has been on a basis of $1.50 a year.

The payment of the extra 12½ cents for each of the last four quarters indicates that the $1.50 basis will continue.

Raymond N. Ball, president of the Lincoln-Alliance Bank & Trust Company of Rochester, was elected a member of the board of directors at the meeting.

CURTIN-HOWE MOVES CHICAGO OFFICE

The Curtin-Howe corporation, timber preservation engineers, of New York, has moved its Chicago office from 410 North Michigan avenue to 20 North Wacker drive. F. S. Shinn, western manager, is in charge of this office. A new office has been opened in Minneapolis, in the Security building, with D. R. Manuel, northwestern manager, in charge.

FOUR EXCHANGES TO INSTALL STROMBERG EQUIPMENT

The Texas Associated Telephone Company of San Antonio recently contracted for two two-section Junior Multiple Switchboards for its Raymondsville and La Feria Exchanges with the Stromberg-Carlson Telephone Manufacturing Company, according to a report from that company. The switchboard for Raymondsville consists of 300 central energy, 24 rural and 16 toll lines and the La Feria board consists of 170 central energy, 16 rural and 8 toll lines. Both switchboards will be complete with power, machine and terminal equipment.

Three sections of the No. 3 unit type Stromberg-Carlson switchboard has been purchased by the General Engineering and Construction Company of Salina, Kansas, for its exchange at Taft, Texas. It consists of 300 central energy, 30 rural

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ESTABLISHED 1904 CHICAGO

Specializing in Manufacture of

CORDS

FOR ALL CLASSES OF TELEPHONE WORK

SIERRE EQUIPMENT CORPORATION
Los Angeles—San Francisco—Seattle—Pacific Coast Distributors

Get EVER-PROTECT aid in your construction.

EVER-PROTECT has proved practical and profitable in making many hundreds of cable installations underground without a conduit. It protects cable against storm damage, corrosion, chemical action, electrolysis and abrasion.
In liquid form EVER-PROTECT is great for overhead work, protecting your cable and messengers against chemical action and other destructive influences.
Ask your nearest jobber for complete details.

National Cable Compound Co.
Incorporated
MITCHELL - - IND.

Dependable
NORTHERN WHITE CEDAR POLES
that offer *utmost* in Quality and Value.
Guaranteed Butt Treatments

MICHIGAN POLE & TIE CO.
NORTHERN AND WESTERN POLES
NEWBERRY, MICHIGAN
Reed City, Mich. YARDS St. Paul, Minn.

To Reach the Man Who Does the Buying Advertise
in
TELEPHONE ENGINEER

Investigate Our Centralized Accounting Plan

This monthly Audit will save you lots of money and give you important information that you should have about your business—the best of all business, if properly managed.

BOWDLE ACCOUNTING SYSTEM
CERRO GORDO ILLINOIS

DEPENDABILITY . . . long life . . . economical operating and maintenance costs are the reasons why the use of Exides is increasing in P.B.X. service.

EXIDE-IRONCLAD P.B.X. BATTERIES

Exide-Ironclad Battery, type B.L.-5, especially designed and constructed for P.B.X. service.

Tubular construction of Exide Ironclad positive plate gives longer battery life.

Exide
BATTERIES
THE ELECTRIC STORAGE BATTERY CO., PHILADELPHIA

"Cope"

Flexible Metal Tubing with Bell Shaped Ferrule and Brass Nozzle which slips into the Duct.

Pull-in Guides for Lead Sheathed Cables

T. J. COPE, Inc.
Manufacturers of
Complete Equipment for Cable Installation
6122 Vine Street, Philadelphia, Pa. 19 So. La Salle Street, Chicago, Ill.

and 10 toll lines. It also will be complete with power, machine and terminal equipment.

The Northern Ohio Telephone Company of Bellevue has purchased six sections of No. 3 unit type Stromberg-Carlson switchboard for Medina, Ohio, consisting of 500 central energy, 80 rural and 30 toll lines. It is complete with power, machine and terminal equipment.

29-YEAR-OLD STROMBERG PHONE TAKEN FROM SERVICE

One more ancient Stromberg-Carlson telephone has been taken out of service after it had been in use since 1901.

The 'phone was removed from a home

Old Stromberg-Carlson telephone just taken out of service at Fairfax, Mo. The phone has been in use since 1901.

in Fairfax, Missouri, by the United Telephone Company. In spite of its age the 'phone still gives wonderful service, but the chief objection was that it took up too much space in the home.

There are two more of these 'phones still in service in Fairfax and according to reports the instruments have given the best of service and they are good for many more years.

The telephone is five feet nine inches high and fourteen and one-half inches wide. It will hold twenty-four No. 6 dry cell batteries.

IMPROVED LINEMAN CONNECTOR BY THE MAKERS OF VACUUM GRIP PLIERS

A new connector for linemen, just placed on the market by the Forged Steel Products Co., Newport, Pa., is notable for an exclusive feature in the form of a locking pin or dowel, which prevents the jaws from getting out of alignment, once they are closed. A toggle

New connector for linemen just placed on market

joint of unusually heavy construction, together with a handle clamp that is held immovably by the spring action of the handles, complete the rigid construction of this tool. It is hammer forged from a special formula electric furnace tool steel, hardened and tempered through and through.

All popular sizes of copper sleeves and bare wire are handled by the new connector, including B & S copper sleeves Nos. 4, 6, 8 and 10 and bare wire Nos. 2, 4, 6 and 8. It also has an oval hole for guy strand .437 and .624.

KELLOGG APPOINTS H. M. STEWART AS DISTRICT MANAGER IN CHARGE OF SALES IN THE SOUTHWEST

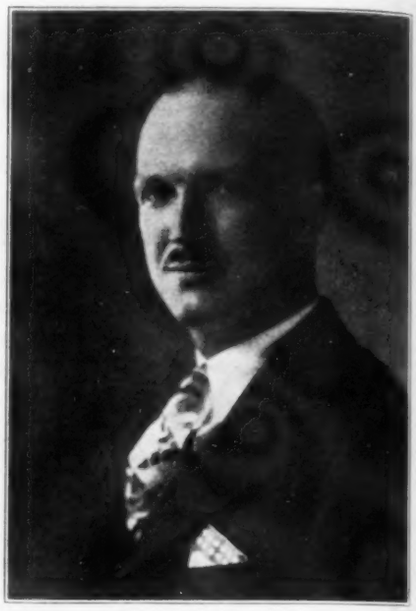
The Kellogg Switchboard and Supply Company announce the appointment of H. M. Stewart as district manager in charge of sales in the Southwest. Mr. Stewart succeeds Mr. Minor Corman, formerly in charge of the Southwestern district, who is taking up other duties.

Kellogg company's Southwestern offices are located in the Kirby Building at Dallas, Texas, from which they serve Texas, Oklahoma, Arkansas and Louisiana.

The field men in this territory who will assist Mr. Stewart include Messrs. C. G. Gardner, J. C. Head and J. A. Stratton. Each of these gentlemen have been representing the Kellogg company for a number of years and need no introduction to their many friends among the Southwestern telephone people.

Mr. Stewart is a close student of telephony, taking full advantage of every opportunity to add to his knowledge of the business. Several years of service with a large operating company, divided among the different developments, and coupled with several years of traveling for the Kellogg company, have given him a good chance to study and learn the operating man's problems from every angle. This experience is rounded out with three years of service in the general offices of the company at Chicago, which completes over fourteen years of experience in the telephone business.

As in the past, the Dallas office will be a sales and service organization, devoted to the study of each individual



H. M. Stewart

telephone man's problems throughout this section of the country.

NEW ROOF FOR POLES HAS ONE-WAY CUT

A new type of pole roof which many utility companies are standardizing upon, is a one-way roof of 15 degrees introduced to the industry by the International Creosoting and Construction company. The cut is so made that it drains water away from the grain.

One of the advantages of the one-way roof is that it reduces checking. A two-way roof leaves a minimum of wood at the center, the natural cleavage point of the pole. This invites checking. The one-way roof does not have this disadvantage.

It is also claimed for the one-way roof that it provides better drainage and conserves the preservative.

As the roof of a pole weathers, the springwood rings, being softer than the summerwood, weather more rapidly, causing the summerwood to stand out. On the two-way roof these form retaining cups for rainwater while on the one-way roof the cups drain, it is claimed. Since evaporation is a surface phenomenom and there is much less surfare on a one-way than on a two-way roof, it is believed to keep the preservative longer.

WALTER DU TOIT GETS PROMOTION

Walter DuToit, who has been employed for nearly two years by the Central Iowa Telephone Co. in its main office, has been made manager of the company's exchange in State Center. Mr. and Mrs. DuToit moved to State Center last Thursday.

TELERING

For Central Office and PBX Ringing

IN USE ALL OVER THE WORLD

ONE REED!

ONE CONTACT!

IDEAL WAVE FORM

REDUCE YOUR RINGING COST

ORDER ONE ON TRIAL

More power than you need

IT PAYS FOR ITSELF

Converts 60 Cycle Lighting Current to 20 Cycle Ringing Current.

POSITIVELY NO RADIO INTERFERENCE

Very low current consumption

Price $44.00—F. O. B. Elyria

Fully Guaranteed

Sold by Leading Telephone Distributors

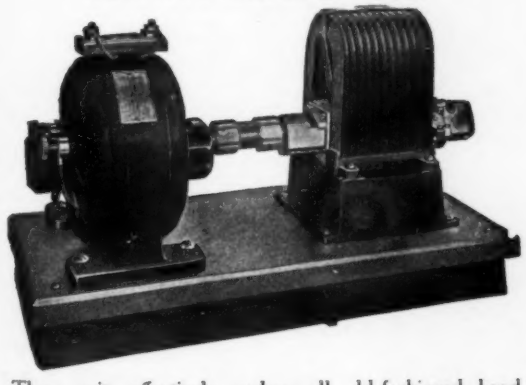
Telkor, Inc., Elyria, Ohio

(Write for booklet)

HOLTZER-CABOT

Magneto - Ringing - Motor - Generators

ALWAYS DEPENDABLE



These units effectively replace all old-fashioned hand and battery ringing methods. Extreme simplicity of operation and low cost offer advantages over all other devices.

Cuts operating expenses by eliminating expensive and troublesome battery equipment.

Make possible a swift, sure, carefree service that pleases both subscriber and operating company as well.

Can be supplied for any voltage or special current. A thorough test will convince you.

Complete data and specifications on request.

HOLTZER - CABOT ELECTRIC CO.

125 Amory Street, Boston, Mass.

6161 So. State Street, Chicago, Ill.

Announcing

The Vacuum-Grip-Built IMPROVED LINEMAN CONNECTOR

AFTER a long series of practical field tests we release this Improved Connector to the linemen of America in the positive knowledge that we have produced a tool of super-performance.

The jaws hold the sleeve or bare wire in an *immovable grip*. Once closed on the sleeve, the holding grooves are perfectly aligned automatically—*and kept in alignment*—by a stout steel pin that true-fits into an opposite socket.

This exclusive feature, together with the strong toggle joint and handle clamp link, keeps the jaws tightly locked on the sleeve or bare wire, without chance for play in any direction, assuring a perfect joint with less effort and time.

Hammer-forged from finest electric furnace alloy tool steel. Hardened and oil tempered thru and thru. Handles specially spring-tempered. Every pair guaranteed to give 100% satisfactory service.

Handles all popular sizes of copper sleeves and bare wire, including B & S Copper Sleeves Nos. 4-6-8-10, Bare Wire Nos. 2-4-6 and 8, and oval hole for guy strand .437 x .624. Price $4.50, parcel post paid.

SPECIAL 30-DAY TRIAL OFFER

Send us the price of the Connector, $4.50, and use it for 30 days. If after that time you are not 100% satisfied with its performance ship it back to us and we will refund the purchase price without question.

Write for further particulars, or better take advantage of our Special Offer.

FORGED STEEL PRODUCTS CO., Newport, Pa.

Vacuum Grip REG. U.S. PAT. OFF. **Pliers**

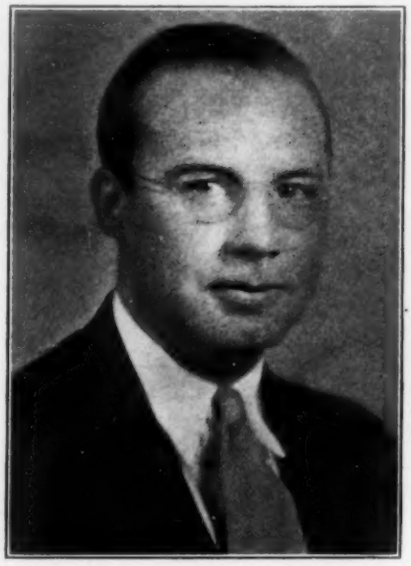
Built *UP* to a Standard-Not *DOWN* to a Price

OVER 650,000 IN USE

STROMBERG REPRESENTATIVES ADD FIVE TO STAFF

On account of the increased business that has been flowing into the Scoville Mercantile Company, of Atlanta, Stromberg-Carlson southern representatives, Frank C. King, manager, has found it necessary to add five new men to his organization.

Four of these men will cover territories and one will be added to the force covering Atlanta, with headquarters in the main offices.



Lewe Sessions

The territory including Tennessee, the northern part of Alabama and the northern part of Mississippi is being covered by Lewe Sessions, with headquarters in Birmingham.

Mr. Sessions hails from the state of Georgia and attended the University of Georgia. He has had a wide experience in all fields of radio and telephone work. For seven years he was in the radio engineering departments of the American Telephone & Telegraph Company, Western Electric Company and R. C. A. His telephone experience was gained by thirteen years with the American Telephone & Telegraph Company, in the southeastern division. Mr. Sessions had four years' experience in retail merchandising, selling radios and refrigerators. He won the General Electric refrigerator cup for the highest merchandising record in the state of Georgia in 1929. He joined the Scoville company June 1, 1930.

Paul H. Prince was appointed July 1, 1930, by Mr. King to cover South Carolina and the Charlotte territory of North Carolina. Mr. Prince is a native of North Carolina and was graduated from the state university. He spent some time in amateur radio building and servicing and later went into the sales department of the Public Hardware Company of Durham, N. C. Mr. Prince had considerable retail experience with this company, the Logan Motor Company of Asheville, N. C., and the Post Radio Store of Philadelphia, Baltimore and Washington. Later, he became radio manager of the North State Electric Supply Company of Raleigh, N. C., Lyric distributors in that state. He held that position until he became associated with the Scoville company.

W. C. Knight

Louisiana, the southern part of Mississippi and Alabama will be covered by W. C. Knight, who came with the Scoville company May 1, 1930. Mr. Knight has worked in the electrical field for seven years. He was formerly with the Emerson Electric Company of St. Louis and the Fitzgerald Manufacturing Company of Torrington, Conn. He covered Virginia, Florida, Alabama, Tennessee, Mississippi and Louisiana for the Fitzgerald Company.

Paul H. Prince

S. H. Manson, who came with the Scoville company July 1, was in the sales department of the Stromberg-Carlson Telephone Manufacturing Company for two years. Mr. Manson was graduated from Dartmouth with the class of 1927. He will spend all of his time in Atlanta.

C. W. Watson, who has been with Stromberg-Carlson since 1908, is covering Virginia, North Carolina and eastern Tennessee for the Scoville company. He became associated with this company June 15.

Mr. Watson became a member of the Stromberg-Carlson installation department in 1908. In 1922 he was transferred to the sales engineering department. Later he left that department to represent Stromberg-Carlson in Kentucky and Tennessee. He covered this district until June 15.

Wants

FOR SALE—Used equipment just removed from service because of cutover to automatic. No. 1317-R W. E. 5-bar 1600-ohm Wall Telephones, $7.00 each; No. 300-M W. E. 5-bar 1600-ohm Bell Boxes, $7.00 each; No. 300-K W. E. 5-bar 2500-ohm Bell Boxes, $7.00 each; 2 No. 1320-A W. E. Common Battery Street or Mine Telephones, $20.00 each; No. 1040-AL W. E. Desk Stands, $5.00 each; No. 1533-A W. E. Common Battery Wall Sets, $5.00 each; No. 7 and No. 20 3-slot Gray Pay Stations, $3.00 each; No. 1001-A W. E. Hand Test Sets, $3.00 each. All in good working order. Also 1 No. 550-B W. E. 80-line PBX Switchboard, $200.00. 1000 lbs. switchboard cable at junk prices. Over $2000.00 worth of equipment already disposed of without a single complaint. Numerous other items at equally attractive prices. The Orange County Telephone Co., Middletown, N. Y.

FOR SALE—No. 17 gauge, new style double conductor, black parallel weatherproof drop wire. This wire is brand new, fresh stock in 1,000 foot coils. While it lasts, $7.00 per 1,000 feet. Wm. M. Miller & Sons, 2553 W. Madison St., Chicago, Ill.

When an automobile crashed into a telephone pole near Connellsville, Pa., thousands of persons were inconvenienced because of damage done to telephone lines between Connellsville and Uniontown. A cable fastened to the pole was cracked, permitting rain to enter, which grounded ten miles of lines.

The Illinois Bell Telephone Employes' Federation of Toll Operators gave its annual outing for members recently at Illinois Air Park near Edgebrook, Ill. More than 450 girls attended.

BOONTON TELEPHONE OFFICE ENLARGED

Work is now completed on the additions to the switchboard equipment in the central telephone office at Boonton, N. J., which provides facilities to take care of the future growth in the town.

The steady growth of the telephone service in the hilltown has gradually reduced the amount of unused switchboard facilities until the new equipment just added will be necessary to keep pace with the continued expansion of the service.

There are now a little less than 3,000 phones being served from the central office. To be exact the number is 2,825 and the additions just made will provide for 475 more which will bring the capacity of the office to 3,300 which it is felt will supply the need for the next few years.

It is estimated that at the present time at least 12,000 calls are being handled daily through this office.

HUGE TELEPHONE ORDER

Telephone apparatus capable of handling ten to twelve million calls annually has just been ordered from the New York Telephone Company by Lucius Boomer, president of the new Waldorf-Astoria. The new hotel's annual telephone bill is expected to total $200,000.

In addition the hotel will have a large telephone-typewriter installation, providing, among other things, transmission of messages to guests.

The new Waldorf's order calls for a 28-position multiple switchboard, equipped for dial and manual operation and provided, in addition to automatic ringing, with audible recall and idle indicators. The Waldorf telephone exchange personnel will number approximately 108 employes, including eighty-four operators, twenty-one supervisors, and three chief supervisors.

The Minnesota railroad and warehouse commission has approved the purchase by the Northwestern Bell Telephone Company of the Strout Telephone Company, rural line operating out of Litchfield, Minn.

MODERN TOOLS ARE ESSENTIAL

(*Continued from page 23.*)

will never come amiss, for they are frequently used around every exchange. The new all iron type wood chisels seem to have a real advantage for they will stand more hammering than the old style wood handle, so consequently are cheaper for all chisels regardless of type will be hammered.

Good hacksaws should always be on hand for they can be used for so many purposes. One place they come in handy is for cutting the nails when removing wood brackets from poles. This method is easy and does not injure either the pole or the bracket. Recent improvements in hacksaws make them ideal for many uses around the telephone plant.

Someone has said that good tools make good workmen, and while this may not be entirely true it is a certainty that even a good workman can't do good work unless he has good tools.

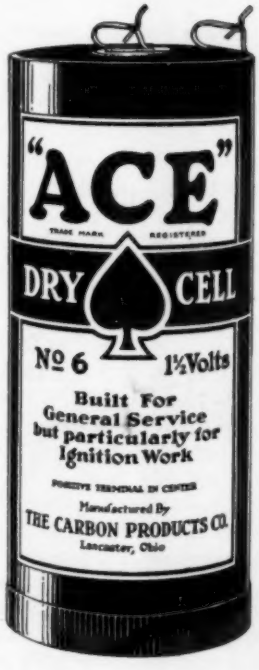
TRAVELERS select the Great Northern for its wonderful location in Chicago's "loop". They return because the large comfortable rooms, homelike environment, attentive service, excellent food and moderate charges make it an ideal hotel.

400 Newly Furnished Rooms
$2.50 a day and up

Sample Rooms
$4.00, $5.00, $6.00
$7.00 and $8.00

Dearborn St. from Jackson to Quincy
New Garage One-Half Block

Outstanding Performance



Precision in their manufacture makes Ace and Victor most uniform.

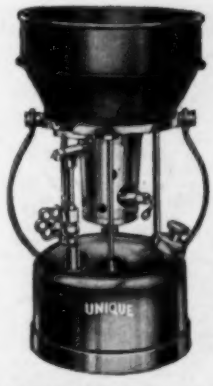
This uniformity, plus the high standard of their ingredients and laboratory control, assure greater Dry Cell Dependability and longer Dry Cell Life.

Specify Them Always

Bond Electric Corp.
JERSEY CITY

Chicago Lancaster San Francisco

Furnaces **UNIQUE** Torches



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BUILT FOR CABLE SPLICERS

A fine tool for an exacting job, with a reputation for long and trouble-free life!

Sent on Trial

UNIQUE MFG. CO., INC.
221 WHITING ST. CHICAGO, ILL.

DEATH OF NAT F. ROBERTS

Nat F. Roberts of New York and Antwerp died at sea in the Atlantic on July 21. At the time of his death Mr. Roberts was technical director of Bell Telephone Manufacturing Company of Antwerp, an associate of the International Telephone & Telegraph Corporation. Mr. Roberts spent his youth in Kendallville, Ind., graduating from Purdue University in 1902, after which he joined the Western Electric Company in Chicago. Later, he became connected with the Bell Telephone Company in Pittsburgh, coming to New York in 1911 with the A. T. & T. Co.

He was acting chief engineer of the Nippon Electric Company in Tokyo from 1924 to 1927, and played a prominent part in the introduction of the automatic telephone in Japan. During the past three years he has been engaged in various telephone activities throughout Europe where he was very well known.

Funeral services were held August 1 at the home of his brother, David D. Roberts, at Kendallville, Ind.

A. T. & T. GROSS UP; NET DOWN

The American Telephone & Telegraph Co. and the Western Union Telegraph Co., in reports to the Interstate Commerce Commission for the first six months of the year, indicate substantial declines in operating income.

The American Telephone & Telegraph Co. reports gross income of $58,189,588 for the first six months of the year, compared with $54,696,001 for the first six months of last year. In spite of this increase, however, operating income for the period totaled $17,686,535, compared with $20,314,529 for the corresponding period of 1929, a decrease of $2,627,094.

Gross income for June totaled $9,504,339, compared with $8,827,699 for June, 1929. Operating income for the month came to $2,509,396, compared with $2,895,900 for June, 1929.

June gross income of Western Union totaled $11,455,006, compared with $12,086,459 for June last year. Operating income for the month aggregated $875,048, compared with $1,292,388 for the same month last year.

ARRANGE RADIO-TELEPHONE SERVICE TO CHINA

Radio-telephone service from the United States to China under the joint ownership of American and Chinese companies will be opened in a few months, according to information received from the communications division of the Department of Commerce regarding the report of Harold D. Robinson, assistant trade commissioner at Shanghai.

Recently the New York Herald Tribune stated that it was reliably reported that the Radio Corporation of America would inaugurate this service through its stations at and near Bolinas, Calif., and Koko Head, Hawaii, but officials of the corporation refused to comment other than to admit that the corporation's bid for the service was a matter of record in Shanghai.

According to a report from Mr. Robinson, the transmitting station at Chengju, about seven miles from Shanghai, will begin operations in the fall and commence direct service to San Francisco, Berlin and Paris from that point. American radio engineers have co-operated with the Chinese government regarding the proposed service and the eight-year agreement entered into between China and the Radio Corporation of the Philippines, subsidiary of the Radio Corporation of America, is also expected to facilitate completion of the service.

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Stromberg 4-bar A. C. or Pulsating current Gen. with crank @	2.25
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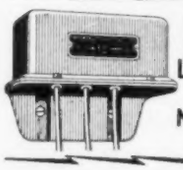
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